Essays on Applied Economics

by

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Declaration

This thesis is submitted to the University of Warwick in accordance with the requirements for the degree of Doctor of Philosophy. I declare that this thesis is my own work and has not been submitted for any other degree.

Hui-Pei Cheng

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Abstract

This thesis includes three empirical essays which cover different topics. Before moving to the main chapters, I would like to briefly discuss the research question and main findings of each project.

Chapter 1 Black-White Wage Convergence in the United States

This paper explores whether there is a pattern of heterogeneous wage convergence between black and white workers in the Southern US relative to the Non-Southern US during the post-Civil Rights era. Heterogeneity in relation to the South may be plausibly associated with a range of determinants: the region's historical experience of slavery, different observable factors, or changing political and social institutions. My evidence from US Census data for 1980, 1990 and 2000 indicates that a strong pattern of "black-black" and "black-white" wage convergence exists between Southern born and Non-Southern born individuals. This wage convergence pattern, particularly amongst black workers, is similar across Southern states associated with different historical intensities of slavery, but it is stronger and more persistent for the low wage groups in the South. In addition, the wage convergence is mainly from the low wage quartile groups. My assessment of the impact of institutional changes as a driver of wage convergence suggests that the changes associated with rising political competition from 1960 to 1980 contributed to rising black wages.

Chapter 2 Hate Crime and Victory of Obama

This paper examines whether Obama's 2008 electoral victory affected hate crimes. Hate crime data from 2005 to 2012 indicate that anti-black and total hate crimes declined significantly in Blue States after Obama won the election, relative to Red States. The drop is even more significant in States that supported the Democratic presidential candidates in the 2004 and 2008 elections. Moreover, this decline is highly associated with the decreasing education gap between black people and white people. These findings suggest that Obama's victory played a role in reducing the number of hate crimes in the US.

Chapter 3 The Long-Run Labor Market Consequences of Being Born in A Bad Economy

Recent studies have shown that an economic or environmental shock at an early stage of life can have a negative long-term impact on health status as well as educational and labour market outcomes. In this study, I examine whether being born during an economic recession affects later-life earnings. By utilising 2000 US Census data, I find that males born between 1965 and 1979 experienced a 1 percent of earning loss with every one unit increase in the unemployment rate at year of birth. The effect is similar in those with and without college education. Moreover, the effect is stronger in the low wage quartile groups. These findings suggest that the labour market consequences of being born in a recession are negative and persistent.

Chapter 1 Black-White Wage Convergence in the United States

1. Introduction

Black-white wage and income inequality in the United States is an important aspect of what Gunnar Myrdal has termed the "American Dilemma."[1] This situation dramatically changed in the 1950s and 1960s as a result of the Civil Rights movement, when protests and campaigns led to the introduction of policies such as the Civil Rights Act of 1964 and Voting Rights Act of 1965. As an illustration, Figure 1 shows the path of the aggregate "black-white" income gap from 1950 to 2014. The gap is measured by the ratio of median income for black versus white males, such that a higher ratio implies a declining wage gap. It is clear from Figure 1 that the racial wage gap declined substantially in the post-Civil Rights era, particularly between the periods 1963 to early 1970s, and from 1992 to the early 2000s.[2] However, beneath this declining aggregate wage and income gap, it is worthwhile to note regional variations in the general pattern. If we decompose the total "black-white" wage gap by region (as shown in Figure 2), it is clear that the wage gap in the Non-South remains stable over time while the wage gap in the South declines sharply. This implies that the Southern states played a central role in the decline of the black-white wage gap in the US overall.

[Figure 1 here]

[Figure 2 here]

[1] This inequality has historical roots in the system of slavery, which imposed severe constraints on the freedom of the black population (e.g. Bertocchi and Dimico (2014)). Although, this system was formally abolished after 1865, the black population still lacked significant freedoms and rights, as white-controlled governments established discriminatory institutions that restricted opportunities and economic rewards across the labour market and the educational and political systems.

[2] Please see the discussion of Chay et al. (2014).

Although studies have identified many factors explaining the decrease in the US black-white gap, there has been relatively little work that has explicitly addressed how the South's different historical experience of slavery contributed, both in terms of the economic conditions that were created by slavery, as well as the complex discriminatory institutions that existed up until the Civil Rights era.[3] In this paper I explore how the policy changes across the labour market and the educational and political systems in the 1950s and 1960s may have weakened the power of discriminatory institutions in the South and actively contributed to black-white convergence.[4] Such a role for institutions could help explain the different pattern of convergence in the South and Non-South.

The core of my general approach is a study of wage convergence patterns between Southern and Non-Southern states. The Southern states are defined as those states that were Confederate States during the Civil War.[5] My empirical strategy first looks at whether a distinctive pattern of regional wage convergence exists for black workers. I refer to this as 'black-black' wage convergence since it represents a closing of wage gaps between black workers on a regional basis. As a point of comparison for this pattern of "black-black" regional convergence, I also study the data for evidence of wage convergence between Southern born whites and Non-Southern born whites. This comparison with "white-white" regional convergence is important because it allows us to rule out a general pattern of regional wage convergence that was driven by general macroeconomic factors at the state-level, for example, secular economic catch-up of the South with the Non-South.

To better understand what is driving wage convergence, I also examine wage convergence patterns within the South, separating Southern states in three ways. First, to consider the role of a history of slavery, I compare "high" and "middle" slavery states, as measured by the state's slaves-to-population ratio in 1865. Second, I examine convergence patterns across wage quartile groups. Finally, to consider the role of changing political institutions, I compare "high" and "low" political competition states, as measured by average state political competition from 1960 to 1980 (following Besley et al. 2010).

[3] Studies have indicated that the decrease in the black-white wage gap, particularly that which occurred in the South, was mainly driven by increasing black wages rather any deterioration of conditions in the white labour market. The possible reasons include the improvement in earning characteristics, for instance education of Southern-born black (e.g. Card and Krueger (1992); Ashenfelter et al. (2006); Chay et al. (2014)) or institutional changes in the post-Civil Rights era (e.g. Donohue and Heckman (1991).

[4] The decline of discriminatory institutional power might capture the labour, educational, political and other social development of each state in the South in the post-Civil era.

[5] The Confederate states during the Civil War include Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas and Virginia.

Practically, my empirical design utilizes a sample of individual "stayer" males (that is, men who still reside in their original state of birth) across successive cohorts born between 1945 and 1959 drawn from the 1980, 1990 and 2000 US Censuses.[6] I implement a difference-in-differences (DID) design to study regional wage convergence between the South and Non-South as well as the heterogeneity of wage convergence inside the South.[7]

The baseline results show that between-cohort wage convergence for the Southern-born black males relative to Non-Southern born black males is evident across data for the 1980, 1990, and 2000 Censuses. However, I do not find a clear pattern of wage convergence pattern between white workers in the South versus in the non-South. Hence this implies that the "black-white" racial wage convergence is driven to a significant extent by Southern black wages effectively "catching up" with Non-Southern black wages.[8] Moreover, in terms of wage convergence across the Southern states that experienced high or middle historical intensities of slavery, I do find evidence that the wage convergence, mainly from the black sample, exists in the states with different historical intensities of slavery. However, there exists no heterogeneous wage convergence pattern between the formerly high slavery states and the formerly middle slavery states.

As for the examination whether the wage convergence pattern may vary across different wage quantile group, the results show that the convergence is stronger and more persistent in the low wage quartile groups in 1990 and 2000, particularly for the black sample. Regarding the effect of political competition level on the wage convergence, the results indicate that wage catch-up of Southern-born sample, mainly for the black, exists in the formerly middle slavery states that was only associated with a high level of political competition as well as in the formerly high slavery states that experienced a high or low level of political competition.

Since I use the non-migrant "male stayer" sample for the analysis of this paper, there may be some concern that issues of labour quality as well as area-level supply may bias the

[6] Following Ashenfelter et al. (2006) and Chay et al. (2014), this paper uses the male worker sample of Census to examine the current topic. This is because the income of male workers is considered as the main source of the family income over this period. Furthermore, male workers typically display full-time attachment to the labour market. Analysis of wage convergence amongst the female workers necessarily involves an additional analysis of labour force participation.

[7] The first difference is time (i.e.: the comparison of older to younger cohorts), the second is region (i.e.: Southern states versus non-Southern states). In addition, I also use "triple differences" approach, which consider race as the third dimension, to examine the "black-white" wage convergence. The estimation results of triple differences are in the appendix.

[8] Since the "black-white" wage convergence is mainly found in 1990 and 2000, I will use the sample in 1990 and 2000 to examine the wage convergence across states with historical root of slavery, wage quartile groups and states associated with political situation changes.

previous empirical findings. Simply put, the "best" quality workers may have out-migrated from key Southern labour markets influencing labour market conditions for the stayers. To address this concern about the quality difference between the Southern-born and Non-Southern born sample, I model the probability of moving conditional on individual educational attainments and also measure the educational composition of out-migrating cohorts. The findings suggest that the quality of the Southern-born stayer sample may be different to the Non-Southern born stayer sample because of this migration issue. To address this concern over quality differences, I control for the education levels in all of my regression analysis. As for the concern regarding labour supply caused by migration, I first construct a migration variable which is measured as the log ratio of the number of black and white migrants flowing into each state. I use it as a further control variable in my regression analysis. The empirical results are similar to the previous findings; hence, they appear to be robust to these concerns.

This paper contributes to the "black-white" wage convergence literature by discussing the heterogeneous wage convergence pattern amongst blacks and whites in the South. Similar to the previous studies, I examine the wage difference between the Southern states and Non-Southern states. However, I explore the heterogeneous patterns of wage convergence between Southern states and Non-Southern states by separating the Southern states into two sub-regional groups according to their historical intensity of slavery. In addition, I examine the wage convergence pattern across wage groups in the South. Finally, I take advantage of the institutional changes in the South from 1960 to 1980 to explore the variation in wage convergence patterns across the Southern states.

The reminder of the paper is structured as follows. Section 2 and Section3 review related literature and discuss the historical background, respectively. Section 4 presents the data. Section 5 discusses the empirical strategy. Section 6 discusses the main results. Section 7 discusses the concern of labour quality and labour supply. Lastly, concludes.

2. Related Literature

This paper mainly focuses on the evolution of racial wage gaps in the US. It is thus related to several studies that have documented the history of racial wage convergence in the US. For instance, Donohue and Heckman (1991) discuss the impact of the Civil Rights Act of 1964 on wage convergence between black and white workers. They find that although there

are core socio-economic factors at play, such as rising education rates and large migration flows which have had a role in driving wage convergence between 1960 and 1980, their work also supports the hypothesis that the Civil Right Act of 1964 plays an important role. Card and Krueger (1992) argue that improvements in school quality also assisted the process of black-white wage convergence. They find that improvements in the relative quality of black schools can explain around 20% of the change in racial wage gap between 1960 and 1980. Ashenfelter et al. (2006) discuss the impact of the Brown vs Board of Education decision of 1954 on racial wage convergence. They find that Southern-born black wages caught up with the Non-Southern-born wages in 1990, as the black demographic benefitted from an educational policy which broke racial segregation in public schools. Chay et al. (2014) examine the racial wage convergence between Southern-born and Rustbelt-born people. Their findings again suggest that racial wage convergence is driven mainly from among blacks born in the South. However, not just educational improvement, but also other pre-market productivity factors (such as disability rates) can explain the improved economic status of the cohorts of blacks born in the South.

This paper also extends the current literature by assessing how the institutional changes driven by the Civil Right (1964) and Voting Right (1965) Acts could have affected wage convergence. In turn, this relates to the literature that emphasizes the importance of initial conditions, either economic or environmental, for children's future development. For example, Kahn (2010) and Oreopoulos et al. (2012) investigate the impact of recessions on the earnings of college graduates. They found that graduating in a bad economy could have a long-term negative effect on future earnings. Some studies have also discussed the influence of environmental shocks on long-term outcomes. For instance, Almond (2006) finds that the cohorts who were *in utero* during the peak of 1918 influenza pandemic exhibited lower educational attainment, lower income, and lower socioeconomic status in later life. Lin and Liu (2014) also find that those *in utero* in 1918 influenza were more likely to have serious health problem. Cheng (2017a) finds that people born in recessionary periods could earn less compared with people born in non-recessionary periods. The children born in recessions could not have enough nutrition to develop their ability for the future since the wealth of their parents might decline a lot in recessions.

3. Historical Background

3.1 Black in the South

Slavery was a formal legal institution in the US until the end of the Civil War in 1865. It was also a key structural basis for the economy in the South. Slaves, mainly from Africa, were effectively a source of wealth for plantation owners in the Southern US. In contrast to the plantation-based economy of the Southern US, the Northern US economy mainly relied on conventional industry. The North did not need the black population as a source of slave labour to sustain or improve its economy. This contrast in structural economic conditions between the South and North helped trigger the Civil War in 1861 over the abolition of slavery (e.g. Foner (1974)). However, during the Civil War, several Southern US states such as Maryland, Delaware, Kentucky, Missouri and West Virginia, still stayed in the Union, while others claimed secession from the Union.[9]

In the aftermath of the Civil War in 1865, the black population finally obtained legal freedom in the Southern US. However, they continued to face struggles relating to institutional discrimination in the years after the Civil War. Du Bios (1935) documents that significant political forces in the South still sought to re-establish *de facto* slavery conditions after the Civil War. Legal structures such as the Black Codes and Jim Crow laws were introduced to limit the economic and social freedoms of the black population. Specifically, the Black Codes restricted black labour market activity and ensured their availability as a lower-cost labour force. The implementation of Jim Crow laws enforced a strict segregation between blacks and white with Southern government's holding that that blacks still a "separate but equal" status in society. The Jim Crow laws separated blacks from the white population in schools, hospitals, hotels and other areas of the labour market. These segregation laws also authorized legal punishment for consorting with the opposite race. Furthermore, the laws also denied blacks the right to vote. In addition to these laws, some anti-black organizations such as the Ku Klux Klan engaged in organised violence against the black population. Hence it is clear that blacks in the South did not enjoy the same economic and political status as whites despite gaining legal freedom after the Civil War.[10]

[9] The states that remained in the Union and those that left the Union can be expected to have different racial attitudes to the black population. The states that claimed secession from the Union are referred to as the Confederacy.

[10] Acemoglu and Robinson (2006) indicate that this is the result from that the Southern US after Civil War exhibited changes of the political institution but the economic institution still unchanged. For more details regarding the institution changes, please see the discussion in their paper.

Conditions changed gradually as significant historical events occurred such as World War I, the Great Depression and World War II. These events weakened the resolve of the white in the South to block the black.[11] At the same time, economic growth in the Southern US fell far behind that of the Northern US since the economy in the South continued to depend on agriculture while the economy in the North was assisted by a strong industrial base. In line with this economic imbalance across regions, a long wave of black migration from South to North took place between 1910 and 1970. During this period, known as the 'Great Migration', there was an estimated total of around 6 million black migrants moving out of the South into the North and other parts of the US.

Although blacks in the South could have access to higher earnings if they chose to move to other places, their social status would still lower than that of white people, due to the segregation laws. Civil rights movements or freedom struggles, which emerged during the 1950s and 1960s, had goals were to end the racial segregation and discrimination against black people and to secure their civil rights. The most significant achievements of the Civil Rights movement are Brown v. Board of Education of 1954, the Civil Rights Act of 1964 and the Voting Right Act of 1965. The Brown decision in 1954 ensured that black people could access more educational resources than before. Black children were given the opportunity to study with white children, in the same schools. The Civil Rights Act, passed in 1964, tended to eliminate discrimination against black people in the workplace. Furthermore, the Voting Rights Act of 1965 ensured black people would have the right to vote and enjoy equal political status in the US. Under these laws, it thus became more difficult for the white population in the south states to exert their traditional level of control over the black community. Furthermore, the legal changes significantly affected the opportunities available to black people. It was an unprecedented advance in the legal and social status of black people in America.

The policies in 1950s and 1960s removed major barriers faced by Southern blacks in the labour market, schools, hospitals and the general political system. These reforms therefore led to a sharp improvement in the economic or social status of blacks in the South. However, the effects of the reforms are likely to have been heterogeneous within the South given that the nature of the discriminatory institutions in place at the time of the Civil Rights reforms varied by state. Furthermore, it is plausible that the strength of these discriminatory institutions was closely related to initial conditions defined in terms of the historical intensity

[11] Acemoglu and Robinson (2006) also argue that the collapse of southern white power was especially hastened after World War II.

of slavery across areas. Hence, this potential heterogeneity in state-level institutions is a key focus of my empirical analysis.

3.2 Political Institutional Condition in the South

The previous section discussed the role of the Black Codes and Jim Crow laws in perpetuating White control of economic and political power in the South. The Civil Rights movement in the 1950s and 1960s weakened the power of white-biased social institutions bu enhancing black rights in a number of domains. For example, the Brown v Board decision greatly increased educational opportunities for black students. The Civil Rights (1964) and Voting Rights (1965) Acts also intervened in stopping the unfair treatment that the black population received in the labour market and political system. These policies affected the general situation such as labour market, politics, education and other social changes in the South. In this section, I would like to discuss a particular changes of political system in the South from 1960 to 1980 and discuss its impact on the wage behaviour of the people in the South.

The changes of political situation from 1960 to 1980, which could be measured by state average political competition (Besely et al. 2010), was mainly driven by the Civil Right (1964) and Voting Right (1965) Acts. Figure 3 describes the political competition across the South and Non-South.[12] From this figure, the level of political competition in the South had a dramatically increase after 1960.[13] In fact, Besley et al. (2010) emphasize that the increasing political competition could make the region's politician propose more pro-growth policies and then improve the economic development. Figure 4 indicates the positive relationship between average personal income and political competition in the South from 1960 to 1980. Thus, the political situation change can be seen as a proxy for an initial economic situation when the people entered the labour market. This change could make the South exhibit different wage convergence relative to the Non-South.

[12] The political competition measure is from Besley et al. (2010). They define a political competition of each state in each year as follows: $k_{st} = -|d_{st} - 0.5|$, where k_{st} is the party-neutral measure and d_{st} is the average vote share of the Democrats in all state-wide races in state s at time t. The max of k_{st} is 0 that indicates the voting share of the Democrats is equal to the one of the Republicans in state s at time t. Because of minus sign, higher values of k_{st} correspond to states and year with more political competition.

[13] In fact, before 1960s, white Southerners were more likely to identify as Democrats than others. However, after 1960s, massive white Southerners departed from supporting the Democratic Party to supporting the Republican Party. Please see more discussion in Kuziemko and Washington (2016).

[Figure 3 here]

[Figure 4 here]

4. Data

4.1 Data and Sample

The main datasets used in this paper are the 1980, 1990 and 2000 US Census files. I focus mainly on the black and white male 'stayer' samples born between 1945 and 1959 across the different Census waves. A stayer is defined as an individual who resides in his place of birth.[14] By tracking the same cohort across Census waves I am therefore able to track wage changes across the employment life cycle. Note here that 'the South' in my working definition refers to the Confederate states, which formed the core areas of the legal slavery system up to the Civil War.

In order to test for heterogeneous wage catch-up patterns within the South, I define two subgroups of states based on 'high' and 'mid-level' intensities of slavery prior to the Civil War. The high-slavery states are those that had a pre-Civil War slavery ratio of above 43 %, the median of the slavery ratio in the Confederate states. The states comprising this group are Alabama, Florida, Georgia, Louisiana, Mississippi and South Carolina.[15] The formerly middle-slavery states are defined as those with a slavery ratio below 43 %, and include Arkansas, North Carolina, Tennessee, Texas and Virginia. Furthermore, in later exercises I split the sample into wage quartiles to see if the regional wage convergence pattern differs across different wage groups.

In terms of institutional differences across states, I classify the Southern sample into two groups: one with low average rates of political competition group and the other with high rates. The low (high) political competition group comprises states with average political competition indexes that are below (above) -0.15, which is the median of state average

[14] The sample used in this analysis is the cohort born after World War II when the collapse of white power occurred. They entered the labour market in 1980 when their ages were between 21 and 35. The reason why I use stayer sample is that a stayer could experience more about the institutional changes that were driven by the policies in 1950s and 1960s, particularly for the sample in the South.

[15] The six states are located in the Deep South, which is a cultural and geographic sub-region in the Southern United States.

political competition in the South from 1960 to 1980. Moreover, I also apply these criteria to the former middle and high slavery states see whether political competition across Southern states could drive different wage catch-up patterns within the states with slavery ratios.[16]

4.2 Descriptive Statistics of Wage

As a first look at the different wage patterns of Southern born and Non-Southern born workers, similar to Ashenfelter et al. (2006), I group the male workers into five year-of-birth cohorts: 1945-47, 1948-50, 1951-53, 1954-56, and 1957-59. Moreover, I assign men a "southern-born" dummy equal to one if they were born in the former Confederate states. The results in Table 1 show that black wages are always lower than white wages across all cohorts and regions. In addition, both black and white wages in the South are lower than their counterparts in the Non-South. Importantly, the wage gap between the South and Non-South decreases across the cohorts, particularly for the black sample. This finding implies that relative to the older cohorts of black workers in the South, the younger cohorts may have benefited from a process of wage catch-up relative to contemporaneous black cohorts in the Non-South.[17]

[Table 1 here]

I also plot the regional log wage gap by racial group from 1980 to 2000 in Figures 5-7. From Figure 5, one can observe that both the black and white wage gaps decrease across cohorts in the data taken from the 1980 Census. This result could be due to the recent labour market entry of the younger cohorts. However, based on the evidence in Figures 6 and 7 we

[16] The previous classification regarding historical root of slavery may capture many possible changes in labour market, educational, political systems and other institutions. The new classification according to the level of political competition particularly captures the effect of changes in political systems. Thus, the new groups are different to the groups under the classification according to the historical slavery ratio.

[17] I also show the average racial real wage of those born in formerly high-slavery states, formerly middle-slavery states and Non-Southern states in Table A1. From results of the Table A1, one can observe people born in the formerly high slavery states earn less than those born in the formerly middle slavery states and those born in the Non-South, especially for the black. This finding shows that there exists regional difference among the black born in the South. One can also observe that the wage gap between the black born in the South, either in the formerly high or middle slavery states, and the black born in the Non-South decreases across cohorts. However, I do not find there is clear wage convergence pattern for the white sample.

can see that the black wage gap shows a strong decreasing trend across successive cohorts. In contrast, there is no sign of a decreasing regional wage gap for white workers the 1990 and 2000 Census data. Taken together these findings provide evidence of differential wage convergence patterns across regions according to race. Specifically, it is clear that black wages in the South grew strongly relative to non-Southern black wages and I focus heavily on this finding in our remaining analysis.

[Figure 5 here]

[Figure 6 here]

[Figure 7 here]

5. Empirical Strategy

5.1 Baseline Regression Model

In my first empirical exercise I develop a regression framework to estimate the between-cohort wage convergence for those born in the South relative to those born in the Non-South by racial groups (black and white). Similar to Ashenfelter et al. (2006) and Chay et al. (2014), I use a simple difference-in-differences regression model (DID) to explore this idea. The advantage of the DID model is that the level of wage of different race-cohorts from different areas would be differenced out in the estimation. That is, even though the initial level of wage of one group was higher than the other group, it will not affect the estimation result. The DID model would measure the area-race wage difference between cohorts. Hence, the DID model can be applied to examine in this study area-race wage convergence. The regression model is as follows.

$$\mathrm{Log}(w_{iby}) = \alpha + \gamma_b + \gamma_y + \sum_{t=1}^{4} \beta_{1,t}(s \times c_t) + x'_{iby}\theta + \epsilon_{iby} \qquad (1)$$

where *i*, *b* and *y* index individuals, place of birth and year of birth, respectively. Further indices that are important are *s* (indicating if a person was born in the South) and *c* for cohort (allowing us to track those born in the same years across successive census waves). The main variable of interest is wage w and *x* is a set of observable covariates such as occupation, industry and education.

The cohort variable is constructed as a 3-year band cohort group such that there are 5 cohort groups in our study. The reference group is those who born between 1945 and 1947. $\beta_{1,t}, t = 1, \dots, 4$ are the main parameters of interest and we can expect that $\beta_{1,t} > 0$ if the wages of the younger cohorts in the South could catch up with their race-cohort counterparts in the Non-South.

It is worthy to mention that the DID setting in the current paper is not a typical setting as shown in the literature since it may not fully identify the causal effects of the policies on the wage outcome. In this paper, we do not have a well-defined treatment group as there might exist samples that migrated to other places such that we may not measure precise effects of the policies. To address this issue, we adopt the stayer sample whose place of residence is the same as place of birth to control the possible bias due to migration. Moreover, since migration inflows could also affect the supply in the labour market of destination, I construct a labour supply variable which measures the inflow of migration and add this variable in the estimation. The empirical results including the migration variable are presented in the section 7.

5.2 Regression Model for Assessing Slavery Related Institutions

Following the baseline model in section 5.1, I extend the model by defining the Southern-born group in terms of two subgroups relating to high and mid intensity experiences of slavery. The regression model below studies how the historical slavery ratio may have affected wage convergence.

$$\mathrm{Log}(w_{iby}) = \alpha + \gamma_b + \gamma_y + \sum_{S=1}^{2}\sum_{t=1}^{4} \beta_{1,St}(S_S \times c_t) + x'_{iby}\theta + \epsilon_{iby} \qquad (2)$$

where $S_S, S = 1, 2$ indicates the Southern states associated with high or middle intensities of slavery. Other variables are the same as in the baseline model and $\beta_{1,St}, S = 1,2, t = 1, \dots, 4$ are the parameters of main interest.[18] If wage convergence exists, these parameters are expected to be positive as stated in Section 5.1. In addition, the magnitudes of the coefficients might be different between the formerly high and middle slavery intensity states if a heterogeneous wage convergence pattern exists.

Finally, I also modify these basic models with additional interactions by wage quartile. This allows me to test whether the pattern of wage convergence differs at high or low wage quartile groups.

5.3 Regression Model for Assessing Political Related Institutions

As mentioned in Section 3.2, the role of the Civil Rights (1964) and Voting Rights (1965) Acts increased the political competition in South from 1960 to 1980. Moreover, Besley et al. (2010) further point out that more pro-growth policies associated with the increasing political competition in the South could improve economic development. Therefore, economic development caused by the increasing political competition could have had an influence on black wage convergence. To examine this idea, I adapt the regression model below to study how the changing political conditions may have affected wage convergence.

$$\text{Log}(w_{iby}) = \alpha + \gamma_b + \gamma_y + \sum_{I=1}^{2}\sum_{t=1}^{4} \beta_{1,It}(S_I \times c_t) + x'_{iby}\theta + \epsilon_{iby} \qquad (3)$$

where $S_I, I = 1, 2$ indicates the Southern states associated with low or high political competition. Other variables follow the same definitions as model (1), with $\beta_{1,It}, I =$

[18] The current model uses the dummy variables that represent formerly high or middle slavery states to examine the regional wage convergence. This approach can give us a clear distinction of wage convergence pattern between the formerly high and middle slavery states. Instead of this approach, one can also use the actual historical slavery intensities of each Southern state in the model to examine the idea. However, the results from continuous slavery ratio may implicitly show us the difference of wage convergence within the Southern states. As this paper would like to see if there exists an explicit heterogeneous wage convergence pattern within the Southern states that experienced high or middle slavery intensities, the dummy variable approach is thus preferred.

$1, 2, t = 1, \ldots, 4$ as the parameters of main interest.[19] We expect that these parameters should be positive if wage convergence exists and varies systematically with state-level political competition. Furthermore, I also examine that whether wage catch-up could vary in the formerly high and middle slavery states that experienced low or high level of political competition.

6. Empirical Results

6.1 Baseline Results

Table 2 displays the baseline estimates of model (1) without fixed effects. The first three columns and the last three columns show the results of the black sample and the white samples, respectively. The results are in line with Figures 5-7, showing between-cohort wage convergence between Southern-born and Non-Southern born blacks. In the first column, the magnitude of the estimated coefficients of the interaction terms indicate that the between-cohort wage convergence for black workers in 1980 is about 6 % to 13 % and only exists for those born between 1954 and 1959. The results from the second and the third columns show the magnitude of the estimates in 1990 and 2000 is about 6-10 % for the young cohorts born between 1948 and 1959. As for the estimation results of the white sample, there is not a very clear pattern of wage convergence. Although the findings in 1980 show that some wage convergence also exists in the white sample, the results of 1980 may not be so reliable since the young cohorts being considered have just entered the labour market at this time and, thus, there might exist some noise in their wage outcomes. Table 3 shows the estimates with fixed effects included. The results confirm that the wage convergence is mainly from the black sample rather than white sample in the South.[20]

[Table 2 here]

[Table 3 here]

[19] We can also use a continuous political competition level variable in the DID analysis. However, this paper would prefer the dummy approach since this approach can give us a clearer picture regarding the heterogeneous wage convergence with the Southern states that associated with high or low political competition level.

[20] Note that the estimation results from this point forward are based on the fixed effects models.

6.2 Baseline Results by States Associated With Historical Slavery Ratio

Table 4 shows the estimation results of the empirical model (2) that considers different areas of the South according to their initial slavery intensities. The first three columns show the results for black workers by sub-region of the South relative to black workers in the Non-South. One can see a clear wage convergence pattern for blacks born in the formerly high slavery states, especially for the younger cohorts that were born between 1951 and 1959. The magnitude of the wage convergence is between 7 % and 16 %. As for black workers born in the formerly middle slavery states, the wage convergence for them relative to the Southern-born black also exists and is estimated as being slightly lower - between 7 % and 11%. However, if one compares the coefficients of interaction terms between the formerly high and middle slavery states across years, there exists no significant difference between the coefficients. Thus, the wage convergence patterns may be similar in the states with different historical experiences of slavery. By comparison the results for the white worker sample, similar to what has been observed from Table 2 and Table3, show no evidence of a clear wage convergence pattern across different years. Although we observe that there exists wage convergence in white sample in 1980 and 1990, the convergence from 1980 white sample could be that they just entered in the labour market and thus there might exist some noise in the data. As for the convergence from the 1990 white worker sample in formerly middle slavery states, this could be driven by the low income group.[21] In addition, one can also notice that the magnitude of the convergence is much smaller than the magnitude of the black wage convergence. [22] [23]

[21] We can confirm this from the results of Table 7.

[22] I also consider the black and white sample together to examine "black-white" wage convergence between regions. Table A2 displays the results of triple difference approach that consider both of the black and white samples. One can observe the between-cohort racial wage convergence for those born in the South relative to those born in the Non-South in 1990 and 2000. The magnitude of the estimates is between 7 % and 11 %. Moreover, Table A3 shows results that take the different subgroups of the South into account. I find evidence of black-white wage convergence for those born in the South relative to those born in the Non-South. The magnitude of the estimates is between 8 % and 13 %. Again, one cannot directly conclude that the "black-white" wage convergence is stronger in the formerly high slavery states since the test shows that the coefficients of formerly high slavery states are not statistically different to the coefficients of formerly middle slavery states.

[23] Instead of the dummy approach, I also use a continuous historical slavery ratio variable in the analysis. The estimation results can be found in Table A4. The results from Table A4 indicate that the wage convergence is mainly from the black sample. The higher the slavery intensity is, the stronger the wage convergence is.

[Table 4 here]

6.3 Results by Wage Quartile Group

Since the regional "black-white" wage convergence is mainly evident for the 1990 and 2000 Census samples, I now focus on these Census years in my subsequent analysis of wage convergence patterns.

Table 5 and 6 show the estimation results from different wage quartiles for the 1990 and 2000 Census years, respectively. For the black sample in 1990 and 2000, the results indicate that wage convergence in the South relative to the Non-South is mainly evident for the first three quartile groups but not in the last quartile group. Again, in contrast I do not find a clear persistent wage convergence pattern across 1990 and 2000 for the sample of white workers. Although there exists some wage convergence for the white sample in the low wage quartile groups in 1990, the magnitude of wage convergence is quite small relative to the estimates from the black sample. This finding indicates that the black sample still plays an important role in the wage convergence observation. If we compare the magnitude of the coefficients between the black and white samples, we can see that the magnitudes are larger in the black sample. Thus, the findings above suggest that there exists a pattern of heterogeneous wage convergence black workers across different wage quartile groups.

[Table 5 here]

[Table 6 here]

In regard to the analysis of sub-regional groups within the South, Table 7 and 8 report the model (2) results for the samples of 1990 and 2000 Census years. The findings are similar to those found earlier in Tables 5 and 6. The magnitude of the convergence pattern is again larger in the black sample relative to the white sample. In addition, the convergence is mainly driven by the bottom wage quartile groups. Moreover, there exists no difference in the magnitude of convergence between workers in the formerly high and middle states.

[Table 7 here]

[Table 8 here]

6.4 The Role of Institutions in Black Wage Convergence

The previous sections have indicated that there were significant cross-regional shifts in black wages from the 1980s onwards. In this section I discuss how the changes in political systems and institutions from 1960 to 1980 may have driven this pattern of black wage convergence.

Table 9 shows the estimation results of empirical model (3) that considers the Southern states associated with different level of political competition. Consistent to the previous findings, we can observe that wage convergence is mainly concentrated in the black sample. Furthermore, if we compare the magnitude of convergence for the black sample between the Southern states associated with low and high level of political competition, we can find the difference between them is not statistically significant.[24]

[Table 9 here]

Table 10 presents the estimation results that considers the sub-regional group within the South associated with different level of political competition. Again, the wage convergence is mainly found in the black sample. Furthermore, if we check the magnitude of convergence for black workers across the Southern states, we find that the convergence is stronger in the formerly high slavery states regardless of any level of political competition as well as in the formerly middle slavery states associated with high political competition. These findings

[24] I also use a continuous political competition variable instead of dummy political variable in the analysis, the results are shown in the Table A5.The results show that the speed of wage catch-up of the sample, particularly the black from the lower political competition Southern states, is faster than those from the higher political competition Southern states. Note that although the estimated coefficients from 2000 Census sample are insignificant, the magnitudes of the coefficients from the black sample are still larger than the white sample.

suggest that a heterogeneous wage convergence pattern for the black sample exists when we consider the slavery intensive states associated with different level of political competition.

[Table 10 here]

7 Labour Quality and Labour Supply Concern

Since sample of labour market 'stayers' in my previous analysis, there may exist concerns that are related to a potential quality difference between the non-migrating stayers in the South versus the Non-South and labour supply induced by inflows of labour migration. To see if there exists a quality difference between these two groups, I firstly examine conditional probability of moving according to education levels since this would be a major driver of labour quality differences.[25] According to the linear probability model (LPM) estimates in Table 11, it is evident that more education people had a higher probability of moving. Moreover, the magnitude of estimated coefficient from well-educated black sample in the South seems to be larger than their counterparts in the Non-South as well as the white sample. Therefore, to address this possible concern, I have added an educational variable to control the quality of sample to alleviate the bias concern. The empirical results that have been shown in the previous section still confirm wage convergence of the black sample.

[Table 11 here]

Furthermore, there is a potential concern about the effect of migration flows on labour supply. Migration outflows from the original states might have reduced labour supply of original states and pushed the wage up. Similarly, migration inflows to the other states would have increased labour supply of other states and pushed the wage down. In net terms, this would bias the measurement of regional wage convergence between South and Non-South. To address the migration outflow concern, I calculate the proportion of movers who had different level of education and resided in the Southern and the Non-Southern states as

[25] Here, the sample with higher education attainments is defined as those who had educational attainments of high school and above and the low-educated sample is defined as those who had educational attainments below 12th grade.

shown in Table 12. From the Table, one can observe that the migration is mainly from the sample with better education. Furthermore, we can observe that the moving proportion of both well-educated Non-Southern born black and white is larger than the moving proportion of their Southern-born counterparts. The migration outflows would make the wage increase more in the Non-south than the South. Thus, the migration outflows could weaken the results of wage convergence. Since the wage convergence of the black sample still exists, the adverse effect on the wage convergence could be mild in the analysis.

[Table 12 here]

To address the migration inflow concern, I calculate the cell size of black and white migration inflows at state of residence, education, industry and cohort levels.[26] Then, I construct a labour supply variable that measures the ratio of the number of black and white migration. I thus re-run the exercises of Tables 3 and Table 4 by controlling the log of this labour supply measure in the regression analysis. The results are presented in the Table 13 and 14. The estimation results show that the effect of state migration labour supply is insignificant. Although the effect is insignificant, one still can see that the migration labour supply in the local market could be positively or negatively related to the wage outcome as shown in the tables. After controlling for the effect of the potential labour supply confounder, we can observe that the wage convergence magnitude is still similar to the magnitude of the baseline estimation as shown in Table 3 and 4. Thus the findings here suggest that the results found before may not be driven by migration labour supply.

[Table 13 here]

[Table 14 here]

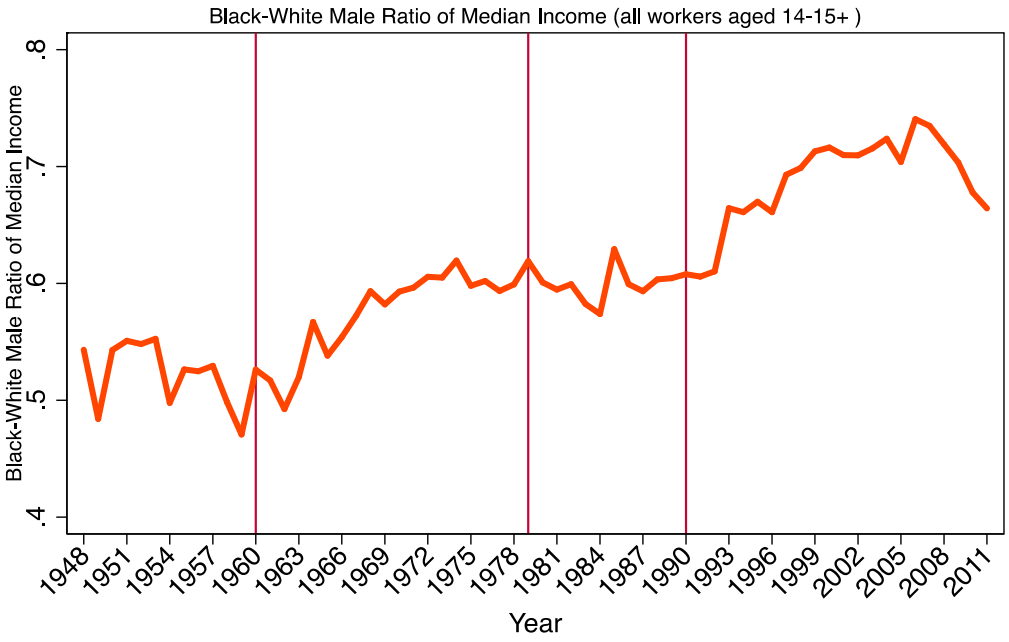
[26] This follows Boustan (2009), who explores the impact of migration between 1940 and 1970 from the South on the wage outcome of the North.

8. Conclusion

This paper discusses the wage convergence between the black and the white by using the male stayer sample born between 1945 and 1959 from the 1980, 1990 and 200 Census data sets. I find evidence of between-cohort "black-black" and "black-white" wage convergence for those in the South relative to those in the Non-South, particularly in the 1990 and 2000 Census cross-sections. Moreover, I find there exists no difference in wage convergence patterns based on their historical experiences of slavery. However, there do exist heterogeneous convergence patterns across the wage quartile groups, and this is particularly strong for blacks in the lowest quartile of the wage distribution. In addition, the magnitude of wage convergence across the wage groups is larger in the black sample compared to the white sample. The findings suggest that the policies that were enacted in the 1950s and 1960s across the labour market and political / educational systems strongly benefited black workers in the South.

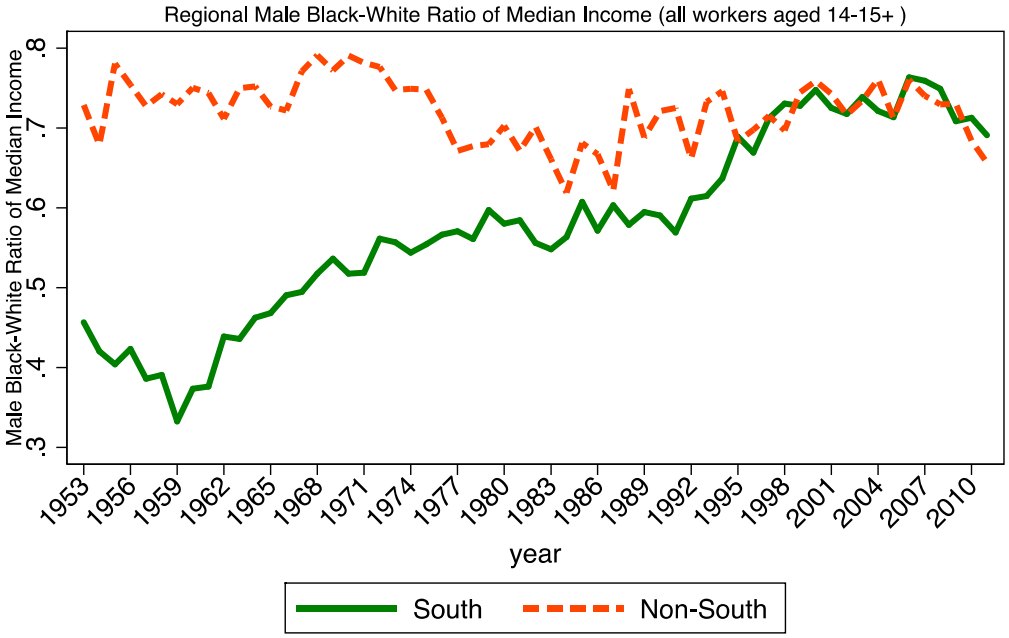
Since the political changes that occurred in the South from 1960 to 1980 were triggered by the Civil Rights (1964) and Voting Rights (1965) Acts, I use the state-level political competition as a proxy measure to capture the extent of the institutional changes. The results indicate that relative to the sample in the Non-South: (1) there exists a stronger wage convergence pattern in the formerly middle slavery states with high levels of political competition; and (2) there also exists a stronger convergence pattern in the formerly high slavery states with high or low levels of political competition. As a consequence, this indicates that institutional changes may have had distinct effects on regional wage convergence amongst blacks over and above the general rise in black wages observed across the US in this period.

Figure 1 Black-White Male Ratio of Median Income



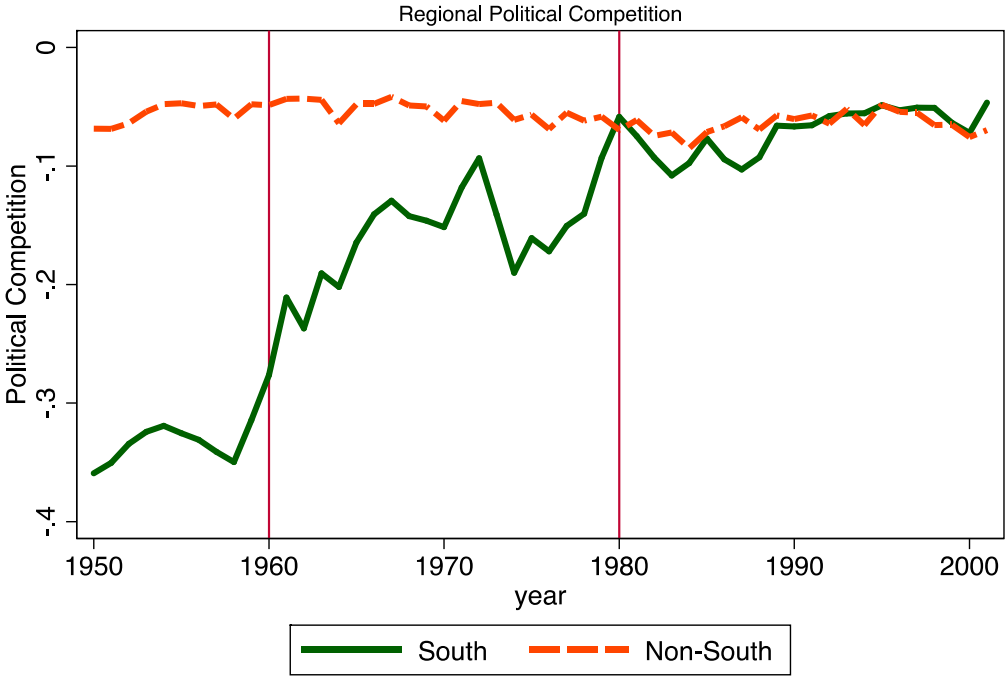
1. Source: the US Census Bureau's Historical Income Tables.
2. Data are for males 15 years-old-and- over beginning with March 1980, and 14 years-old-and-over for prior years.

Figure 2 Black-White Male Ratio of Median Income by Region



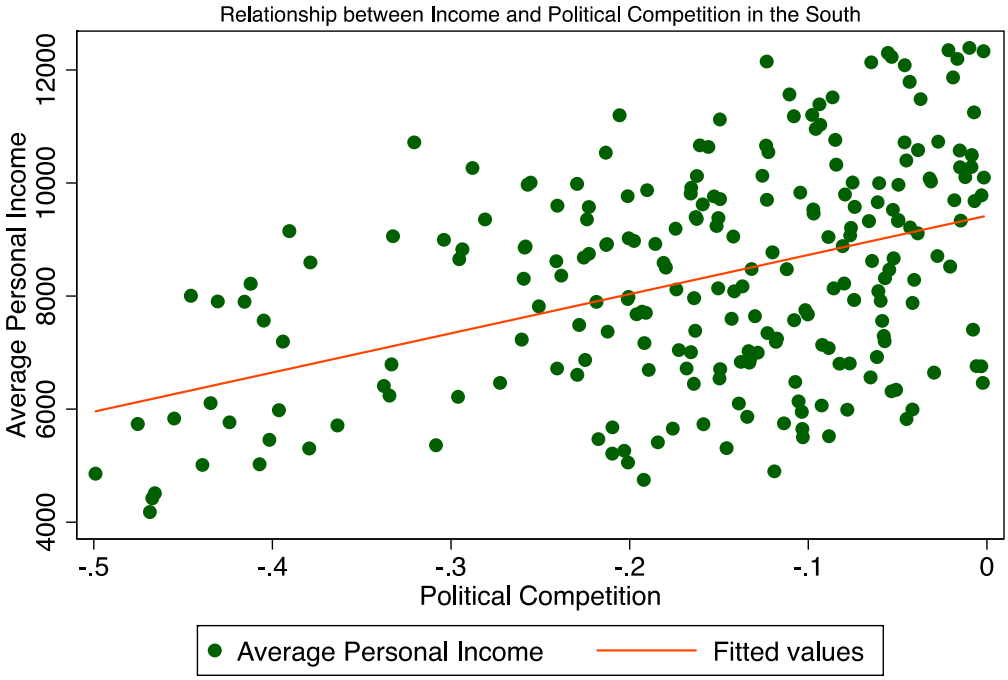
1. Source: the US Census Bureau's Historical Income Tables.
2. Data are for males 15 years-old-and- over beginning with March 1980, and 14 years-old-and-over for prior years.

Figure 3 Political Competition by Region



1. Source: Besley et al. (2010).

Figure 4 Income and Political Competition



1. Source: Besley et al. (2010).

Table 1 Descriptive Statistics of Wage by Regions and Cohorts

Panel A Black

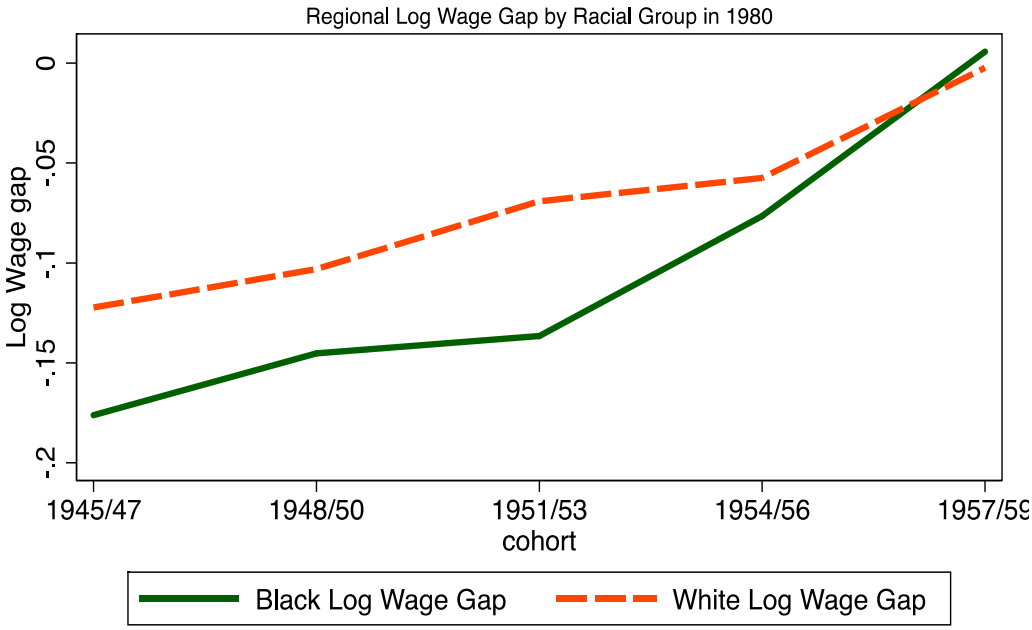
Year	1980			1990			2000		
Cohort	South	Non-South	Diff	South	Non-South	Diff	South	Non-South	Diff
45-47	15.7	18.9	-3.2	16.5	22.1	-5.6	18.6	23.9	-5.3
48-50	14.5	17.1	-2.6	16.2	20.9	-4.7	18.8	23.4	-4.6
51-53	13.0	15.1	-2.1	15.3	19.1	-3.8	18.3	22.2	-3.9
54-56	11.0	12.3	-1.3	14.0	17.6	-3.6	17.5	20.7	-3.2
57-59	7.9	8.4	-0.5	12.8	15.6	-2.8	16.4	19.6	-3.2
Long Diff in Diff (57-59 versus 45-47)									
	2.7***			2.6***			2.1***		
	(0.2)			(0.3)			(0.5)		

Panel B White

Year	1980			1990			2000		
Cohort	South	Non-South	Diff	South	Non-South	Diff	South	Non-South	Diff
45-47	22.7	25.2	-2.5	26.1	29.9	-3.8	28.7	31.2	-2.5
48-50	20.6	22.5	-1.9	25.2	28.5	-3.3	29.1	31.2	-2.1
51-53	18.3	19.6	-1.3	23.7	26.5	-2.8	28.2	30.4	-2.2
54-56	15.0	15.9	-0.9	22.0	24.7	-2.7	27.5	29.7	-2.2
57-59	10.8	10.9	-0.1	19.8	22.6	-2.8	26.1	29.0	-2.9
Long Diff in Diff (57-59 versus 45-47)									
	2.4***			1.0***			-0.4		
	(0.9)			(0.2)			(0.3)		

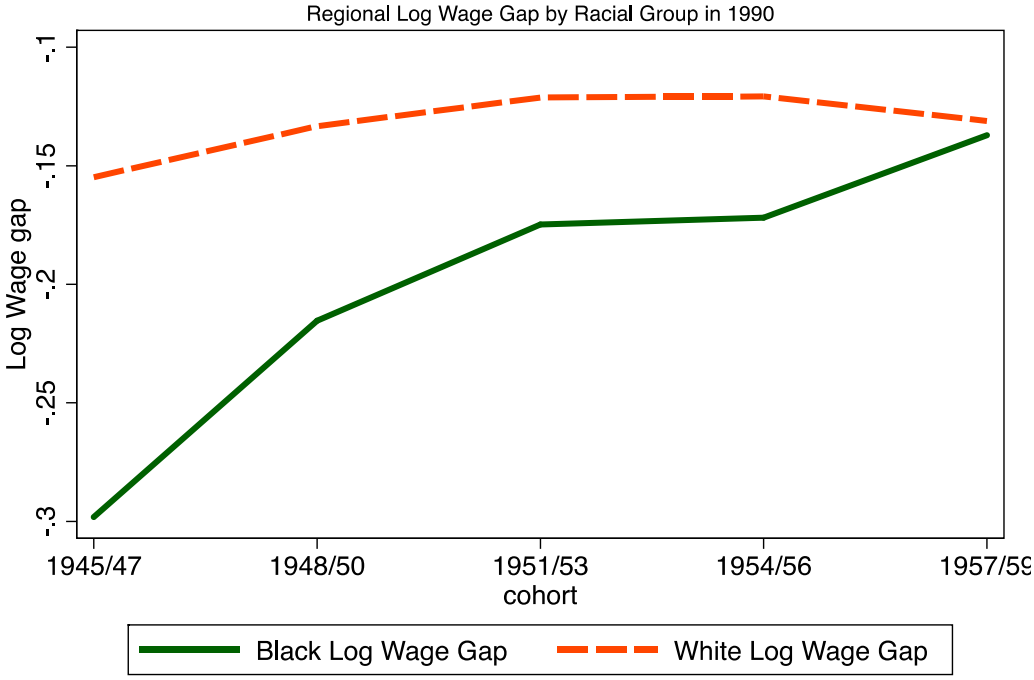
Notes: This table reports mean wages by pooled 3-year band cohorts for Black and White men over 1980, 1990 and 2000 Census waves. Units are given in thousands of dollars and wages have been deflated by the US consumer price index (1982-1984==100). The states in the South are defined as: Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas and Virginia. The states in the Non-South are all other states. Number in the parentheses is standard error. *** indicates 1 % significance level.

Figure 5 Log Wage Gap by Race in 1980



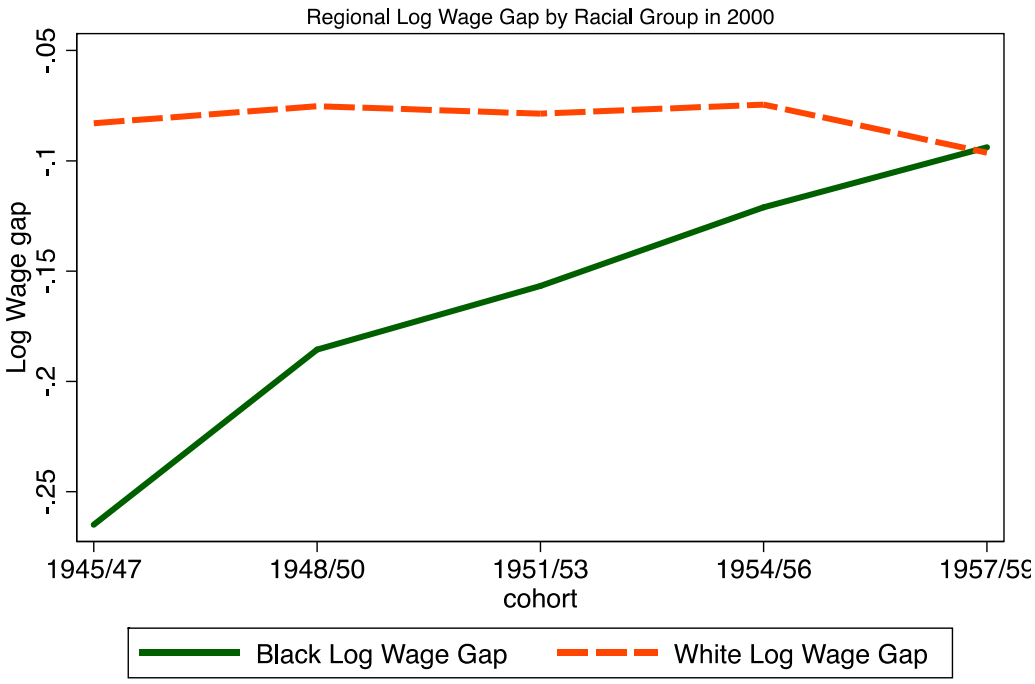
1. Source: 1980 United State Census.
2. The black wage gap is log(wage) difference between Southern-born black and Non-Southern-born black in each cohort.
3. The white wage gap is log(wage) difference between Southern-born white and Non-Southern-born white in each cohort.

Figure 6 Log Wage Gap by Race in 1990



1. Source: 1990 United State Census.

Figure 7 Log Wage Gap by Race in 2000



1. Source: 2000 United State Census.

Table 2 DID Estimation without Fixed Effects

	Black			White		
Year	1980	1990	2000	1980	1990	2000
South	-0.116***	-0.140***	-0.157***	-0.094***	-0.104***	-0.054**
	(0.040)	(0.043)	(0.035)	(0.033)	(0.028)	(0.024)
Cohort4850	-0.124***	-0.101***	-0.019	-0.116***	-0.058***	0.014***
	(0.023)	(0.030)	(0.037)	(0.008)	(0.003)	(0.004)
Cohort5153	-0.256***	-0.214***	-0.099***	-0.274***	-0.115***	-0.005
	(0.020)	(0.031)	(0.025)	(0.014)	(0.005)	(0.007)
Cohort5456	-0.497***	-0.307***	-0.177***	-0.512***	-0.177***	-0.021***
	(0.010)	(0.031)	(0.024)	(0.022)	(0.005)	(0.006)
Cohort5759	-0.952***	-0.425***	-0.216***	-0.951***	-0.249***	-0.038***
	(0.016)	(0.041)	(0.030)	(0.034)	(0.007)	(0.005)
SouthXCohort4850	0.009	0.074**	0.026	0.016	0.009	-0.002
	(0.025)	(0.035)	(0.043)	(0.011)	(0.007)	(0.007)
SouthXCohort5153	0.014	0.093**	0.060*	0.048***	0.010	-0.007
	(0.025)	(0.036)	(0.033)	(0.015)	(0.008)	(0.010)
SouthXCohort5456	0.063***	0.087**	0.101***	0.058**	0.018**	-0.000
	(0.015)	(0.035)	(0.031)	(0.023)	(0.009)	(0.009)
SouthXCohort5759	0.130***	0.100**	0.089**	0.103***	0.010	-0.018*
	(0.025)	(0.043)	(0.039)	(0.036)	(0.010)	(0.010)
R-squared	0.139	0.100	0.079	0.186	0.116	0.098
Place of Birth	NO	NO	NO	NO	NO	NO
Year of Birth	NO	NO	NO	NO	NO	NO
Controls	YES	YES	YES	YES	YES	YES
Observation	77,060	57,646	55,181	676,474	595,391	537,732

Note: Number in the parentheses is the standard error clustered by the place of birth. *** indicates 1% significance level; ** indicates 5% significance level; * indicates 10% significance level. Regressions are weighted by sample weights. Controls include education, occupation and industry.

Table 3 DID Estimation with Fixed Effects

	Black			White		
Year	1980	1990	2000	1980	1990	2000
SouthXCohort 4850	0.015	0.075**	0.026	0.015	0.006	-0.005
	(0.026)	(0.035)	(0.044)	(0.010)	(0.006)	(0.007)
SouthXCohort 5153	0.023	0.098**	0.062*	0.045***	0.007	-0.011
	(0.025)	(0.037)	(0.033)	(0.015)	(0.008)	(0.010)
SouthXCohort 5456	0.072***	0.096***	0.104***	0.056**	0.017*	-0.003
	(0.016)	(0.035)	(0.031)	(0.023)	(0.009)	(0.009)
SouthXCohort 5759	0.137***	0.114**	0.092**	0.101***	0.009	-0.020*
	(0.026)	(0.043)	(0.040)	(0.036)	(0.011)	(0.010)
R-squared	0.150	0.108	0.084	0.198	0.131	0.110
Place of Birth	YES	YES	YES	YES	YES	YES
Year of Birth	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES
Observation	77,060	57,646	55,181	676,474	595,391	537,732

Note: Number in the parentheses is the standard error clustered by the place of birth. *** indicates 1% significance level; ** indicates 5% significance level; * indicates 10% significance level. Regressions are weighted by sample weights. Controls include education, occupation and industry.

Table 4 DID Estimation by Regional Subgroup

	Black			White		
Year	1980	1990	2000	1980	1990	2000
HighXCohort 4850	0.017	0.058	0.068	0.020*	-0.009	-0.006
	(0.025)	(0.040)	(0.041)	(0.011)	(0.008)	(0.011)
HighXCohort 5153	0.009	0.106**	0.093**	0.038**	-0.008	0.002
	(0.027)	(0.041)	(0.037)	(0.018)	(0.009)	(0.016)
HighXCohort 5456	0.073***	0.095**	0.134***	0.054**	-0.001	0.014
	(0.019)	(0.035)	(0.028)	(0.027)	(0.012)	(0.011)
HighXCohort 5759	0.161***	0.125**	0.104**	0.107***	0.001	-0.019
	(0.033)	(0.047)	(0.040)	(0.040)	(0.008)	(0.015)
MidXCohort 4850	0.013	0.098**	-0.024	0.011	0.016**	-0.005
	(0.034)	(0.037)	(0.051)	(0.012)	(0.007)	(0.008)
MidXCohort 5153	0.040	0.086**	0.025	0.050***	0.017*	-0.019*
	(0.033)	(0.042)	(0.041)	(0.015)	(0.009)	(0.011)
MidXCohort 5456	0.070***	0.098**	0.068	0.057**	0.029***	-0.014
	(0.023)	(0.047)	(0.042)	(0.024)	(0.009)	(0.009)
MidXCohort 5759	0.107***	0.100**	0.079	0.098***	0.015	-0.020
	(0.025)	(0.044)	(0.053)	(0.036)	(0.015)	(0.012)
R-squared	0.150	0.108	0.084	0.198	0.131	0.110
Place of Birth	YES	YES	YES	YES	YES	YES
Year of Birth	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES
Observation	77,060	57,646	55,181	676,474	595,391	537,732

Note: Number in the parentheses is the standard error clustered by the place of birth. *** indicates 1% significance level; ** indicates 5% significance level; * indicates 10% significance level. Regressions are weighted by sample weights. Controls include education, occupation and industry.

Table 5 1990 DID Estimation by Wage Quartile Group

	Black				White			
Quartile Group	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
SouthXCohort4850	0.173**	0.096***	0.039***	0.000	0.021	0.013***	0.017***	0.024***
	(0.083)	(0.013)	(0.010)	(0.019)	(0.013)	(0.002)	(0.003)	(0.008)
SouthXCohort5153	0.159**	0.131***	0.057***	0.028	0.009	0.020***	0.019***	0.017**
	(0.072)	(0.012)	(0.010)	(0.017)	(0.014)	(0.002)	(0.002)	(0.007)
SouthXCohort5456	0.226***	0.135***	0.061***	0.029	0.078***	0.025***	0.014***	0.007
	(0.066)	(0.012)	(0.009)	(0.021)	(0.014)	(0.002)	(0.003)	(0.009)
SouthXCohort5759	0.206**	0.168***	0.076***	0.014	0.035**	0.025***	0.017***	-0.006
	(0.080)	(0.013)	(0.011)	(0.016)	(0.017)	(0.003)	(0.002)	(0.007)
R-squared	0.187	0.774	0.830	0.474	0.191	0.821	0.822	0.414
Place of Birth	YES	YES	YES	YES	YES	YES	YES	YES
Year of Birth	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Observation	15,033	14,661	14,151	13,801	153,222	148,793	149,368	144,008

Note: Number in the parentheses is the standard error clustered by the place of birth. *** indicates 1% significance level; ** indicates 5% significance level; * indicates 10% significance level. Regressions are weighted by sample weights. Controls include education, occupation and industry.

Table 6 2000 DID Estimation by Wage Quartile Group

	Black				White			
Quartile Group	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
South X Cohort4850	0.104	0.070***	0.029**	-0.016	-0.044**	-0.004	0.003*	0.006
	(0.090)	(0.013)	(0.013)	(0.020)	(0.017)	(0.003)	(0.002)	(0.010)
South X Cohort5153	0.203**	0.084***	0.036***	-0.010	-0.018	0.013***	0.003	-0.009
	(0.078)	(0.013)	(0.011)	(0.027)	(0.019)	(0.003)	(0.002)	(0.010)
South X Cohort5456	0.260***	0.139***	0.047***	-0.012	-0.029	0.016***	0.005*	-0.022***
	(0.071)	(0.010)	(0.009)	(0.028)	(0.019)	(0.003)	(0.003)	(0.007)
South X Cohort5759	0.302***	0.124***	0.047***	-0.024	-0.048***	-0.011***	-0.016***	-0.033***
	(0.085)	(0.013)	(0.010)	(0.025)	(0.016)	(0.004)	(0.003)	(0.010)
R-squared	0.143	0.733	0.774	0.276	0.131	0.752	0.776	0.391
Place of Birth	YES	YES	YES	YES	YES	YES	YES	YES
Year of Birth	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Observation	14,236	14,028	13,684	13,233	137,620	134,929	134,928	130,255

Note: Number in the parentheses is the standard error clustered by the place of birth. *** indicates 1% significance level; ** indicates 5% significance level; * indicates 10% significance level. Regressions are weighted by sample weights. Controls include education, occupation and industry.

Table 7 1990 DID Estimation by Quartile and Regional Subgroup

	Black				White			
Quartile Group	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
High X Cohort4850	0.131	0.096***	0.032***	-0.013	0.011	0.015***	0.018***	0.021
	(0.093)	(0.016)	(0.010)	(0.020)	(0.023)	(0.003)	(0.002)	(0.012)
High X Cohort5153	0.168**	0.135***	0.056***	0.016	-0.009	0.019***	0.021***	0.013
	(0.073)	(0.015)	(0.011)	(0.021)	(0.020)	(0.004)	(0.003)	(0.009)
High X Cohort5456	0.213***	0.132***	0.059***	0.023	0.051*	0.025***	0.013***	0.005
	(0.070)	(0.015)	(0.012)	(0.021)	(0.026)	(0.005)	(0.004)	(0.014)
High X Cohort5759	0.212**	0.163***	0.076***	0.017	0.047*	0.027***	0.017***	-0.017
	(0.098)	(0.015)	(0.012)	(0.020)	(0.024)	(0.005)	(0.003)	(0.011)
Mid X Cohort4850	0.234***	0.095***	0.047***	0.015	0.027**	0.012***	0.017***	0.026**
	(0.083)	(0.012)	(0.014)	(0.025)	(0.012)	(0.002)	(0.004)	(0.011)
Mid X Cohort5153	0.147*	0.126***	0.060***	0.041**	0.019	0.021***	0.018***	0.020**
	(0.086)	(0.013)	(0.013)	(0.020)	(0.013)	(0.002)	(0.003)	(0.010)
Mid X Cohort5456	0.245***	0.138***	0.063***	0.036	0.095***	0.025***	0.014***	0.009
	(0.078)	(0.012)	(0.008)	(0.031)	(0.008)	(0.002)	(0.003)	(0.011)
Mid X Cohort5759	0.198**	0.174***	0.076***	0.010	0.027	0.024***	0.017***	0.001
	(0.077)	(0.013)	(0.014)	(0.024)	(0.022)	(0.002)	(0.003)	(0.008)
R-squared	0.187	0.774	0.830	0.474	0.191	0.821	0.822	0.414
Place of Birth	YES	YES	YES	YES	YES	YES	YES	YES
Year of Birth	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Observation	15,033	14,661	14,151	13,801	153,222	148,793	149,368	144,008

Note: Number in the parentheses is the standard error clustered by the place of birth. *** indicates 1% significance level; ** indicates 5% significance level; * indicates 10% significance level. Regressions are weighted by sample weights. Controls include education, occupation and industry.

Table 8 2000 DID Estimation by Quartile and Regional Subgroup

	Black				White			
Quartile Group	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
High X Cohort4850	0.190*	0.074***	0.027*	-0.021	-0.011	-0.000	0.002	0.004
	(0.094)	(0.013)	(0.014)	(0.027)	(0.027)	(0.005)	(0.002)	(0.015)
High X Cohort5153	0.241***	0.089***	0.035**	-0.019	0.004	0.019***	0.003	-0.010
	(0.087)	(0.017)	(0.013)	(0.034)	(0.035)	(0.002)	(0.004)	(0.011)
High X Cohort5456	0.310***	0.144***	0.043***	-0.021	0.007	0.021***	0.010***	-0.021**
	(0.074)	(0.011)	(0.011)	(0.033)	(0.033)	(0.004)	(0.003)	(0.009)
High X Cohort5759	0.321***	0.129***	0.044***	-0.038	-0.029	-0.007	-0.012***	-0.037***
	(0.092)	(0.014)	(0.012)	(0.032)	(0.032)	(0.006)	(0.004)	(0.010)
Mid X Cohort4850	-0.012	0.064***	0.032**	-0.011	-0.064***	-0.006**	0.004***	0.007
	(0.101)	(0.016)	(0.015)	(0.018)	(0.017)	(0.003)	(0.001)	(0.012)
Mid X Cohort5153	0.152	0.076***	0.037***	-0.000	-0.031*	0.008***	0.004	-0.009
	(0.100)	(0.014)	(0.011)	(0.026)	(0.015)	(0.002)	(0.003)	(0.014)
Mid X Cohort5456	0.192*	0.132***	0.052***	-0.003	-0.050***	0.012***	0.002	-0.022***
	(0.103)	(0.011)	(0.008)	(0.029)	(0.015)	(0.003)	(0.003)	(0.007)
Mid X Cohort5759	0.278**	0.117***	0.051***	-0.009	-0.059***	-0.014***	-0.018***	-0.030**
	(0.114)	(0.014)	(0.014)	(0.027)	(0.011)	(0.004)	(0.003)	(0.014)
R-squared	0.144	0.733	0.774	0.277	0.131	0.752	0.776	0.391
Place of Birth	YES	YES	YES	YES	YES	YES	YES	YES
Year of Birth	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Observation	14,236	14,028	13,684	13,233	137,620	134,929	134,928	130,255

Note: Number in the parentheses is the standard error clustered by the place of birth. *** indicates 1% significance level; ** indicates 5% significance level; * indicates 10% significance level. Regressions are weighted by sample weights. Controls include education, occupation and industry.

Table 9 DID Estimation by Political Change

	1990		2000	
	Black	White	Black	White
Low Competition X Cohort4850	0.046	-0.005	0.058	-0.008
	(0.042)	(0.009)	(0.041)	(0.011)
Low Competition X Cohort5153	0.103**	-0.007	0.062	-0.010
	(0.042)	(0.009)	(0.040)	(0.015)
Low Competition X Cohort5456	0.090**	0.013	0.130***	0.009
	(0.037)	(0.013)	(0.030)	(0.012)
Low Competition X Cohort5759	0.110**	0.005	0.090**	-0.027*
	(0.046)	(0.009)	(0.039)	(0.013)
High Competition X Cohort4850	0.107***	0.013*	-0.006	-0.004
	(0.034)	(0.007)	(0.052)	(0.008)
High Competition X Cohort5153	0.092**	0.015	0.063*	-0.012
	(0.041)	(0.009)	(0.037)	(0.011)
High Competition X Cohort5456	0.103**	0.020**	0.077*	-0.009
	(0.044)	(0.010)	(0.039)	(0.009)
High Competition X Cohort5759	0.119**	0.012	0.095*	-0.016
	(0.047)	(0.014)	(0.052)	(0.012)
R-squared	0.108	0.131	0.084	0.110
Place of Birth	YES	YES	YES	YES
Year of Birth	YES	YES	YES	YES
Controls	YES	YES	YES	YES
Observation	57,646	595,391	55,181	537,732

Note: Number in the parentheses is the standard error clustered by the place of birth. *** indicates 1% significance level; ** indicates 5% significance level; * indicates 10% significance level. Regressions are weighted by sample weights. Controls include education, occupation and industry.

Table 10 DID Estimation by Political Change and Regional Subgroup

	1990		2000	
	Black	White	Black	White
(High Slavery and Low Competition) X Cohort4850	0.053	-0.008	0.064	-0.009
	(0.043)	(0.009)	(0.040)	(0.012)
(High Slavery and Low Competition) X Cohort5153	0.108**	-0.010	0.080**	-0.006
	(0.043)	(0.010)	(0.036)	(0.016)
(High Slavery and Low Competition) X Cohort5456	0.097**	0.005	0.139***	0.013
	(0.037)	(0.012)	(0.028)	(0.013)
(High Slavery and Low Competition) X Cohort5759	0.113**	0.001	0.091**	-0.029*
	(0.047)	(0.008)	(0.040)	(0.015)
(High Slavery and High Competition) X Cohort4850	0.088***	-0.015***	0.097**	0.011**
	(0.029)	(0.003)	(0.040)	(0.004)
(High Slavery and High Competition) X Cohort5153	0.095***	0.003	0.177***	0.043***
	(0.031)	(0.005)	(0.027)	(0.007)
(High Slavery and High Competition) X Cohort5456	0.085***	-0.028***	0.109***	0.025***
	(0.030)	(0.005)	(0.026)	(0.006)
(High Slavery and High Competition) X Cohort5759	0.192***	0.000	0.182***	0.022***
	(0.041)	(0.007)	(0.032)	(0.005)

Table 10 DID Estimation by Political Change and Regional Subgroup

(Mid Slavery and Low Competition) X Cohort4850	-0.107***	0.017***	-0.032	0.001
	(0.029)	(0.003)	(0.039)	(0.004)
(Mid Slavery and Low Competition) X Cohort5153	-0.002	0.020***	-0.230***	-0.042***
	(0.030)	(0.004)	(0.026)	(0.007)
(Mid Slavery and Low Competition) X Cohort5456	-0.052*	0.077***	-0.021	-0.031***
	(0.029)	(0.005)	(0.025)	(0.007)
(Mid Slavery and Low Competition) X Cohort5759	0.035	0.040***	0.073**	-0.009*
	(0.039)	(0.007)	(0.031)	(0.005)
(Mid Slavery and High Competition) X Cohort4850	0.111***	0.016**	-0.024	-0.005
	(0.036)	(0.007)	(0.052)	(0.008)
(Mid Slavery and High Competition) X Cohort5153	0.091**	0.016	0.043	-0.018*
	(0.044)	(0.010)	(0.035)	(0.011)
(Mid Slavery and High Competition) X Cohort5456	0.107**	0.026***	0.074*	-0.013
	(0.048)	(0.008)	(0.043)	(0.009)
(Mid Slavery and High Competition) X Cohort5759	0.103**	0.013	0.080	-0.021
	(0.045)	(0.016)	(0.055)	(0.013)
R-squared	0.108	0.131	0.084	0.110
Place of Birth	YES	YES	YES	YES
Year of Birth	YES	YES	YES	YES
Controls	YES	YES	YES	YES
Observation	57,646	595,391	55,181	537,732

Note: Number in the parentheses is the standard error clustered by the place of birth. *** indicates 1% significance level; ** indicates 5% significance level; * indicates 10% significance level. Regressions are weighted by sample weights. Controls include education, occupation and industry.

Table 11 Linear Probability Regression Estimation for Moving Decision

Panel A Sample in 1990				
Dependent	Mover			
	Black		White	
	South	Non-South	South	Non-South
Grade>=12	0.120***	0.079***	0.125***	0.094***
	(0.006)	(0.009)	(0.003)	(0.003)
R-squared	0.026	0.006	0.009	0.004
Observation	55,501	32,647	198,056	748,357
Panel B Sample in 2000				
Dependent	Mover			
	Black		White	
	South	Non-South	South	Non-South
Grade>=12	0.121***	0.081***	0.135***	0.100***
	(0.006)	(0.010)	(0.004)	(0.003)
R-squared	0.0203	0.004	0.008	0.003
Observation	54,641	33,112	183,832	699,652

Note: Number in the parentheses is robust standard error. *** indicates 1 % significance level. Regressions are weighted by sample weights. Cohort fixed effect is considered in the estimation.

Table 12 Proportion of the movers to the whole locally-born sample by education

Panel A Sample in 1990

	Black		White	
	South-born	Non-South born	South-born	Non-South born
Grade<12	5.25%	2.86%	2.87%	1.89%
	(20.49%)	(10.35%)	(13.38%)	(6.30%)
Grade>=12	29.22%	31.95%	28.87%	36.61%
	(79.51%)	(89.65%)	(86.62%)	(93.70%)

Panel B Sample in 2000

	Black		White	
	South-born	Non-South born	South-born	Non-South born
Grade<12	4.47%	2.85%	2.26%	1.61%
	(16.83%)	(9.29%)	(10.66%)	(5.03%)
Grade>=12	31.88%	35.51%	30.35%	39.22%
	(83.17%)	(90.69%)	(89.34%)	(94.97%)

Note: Number not in the parentheses is the proportion of movers in the same education group. For example, the proportion of Southern-born black who had grade higher than 12 is (number of Southern-born well-educated black movers)/ (number of Southern-born well-educated black). Number in the parentheses is the proportion of movers to the whole sample. For example, the proportion of Southern-born black who had grade higher than 12 is (number of well-educated Southern-born black movers)/ (total number of Southern-born black).

Table 13 Estimation Considering State Labour Supply

	1990		2000	
	Black	White	Black	White
State Labour Supply	0.016	0.002	-0.001	-0.001
	(0.015)	(0.006)	(0.010)	(0.007)
South X Cohort4850	0.074**	0.008	0.023	-0.005
	(0.034)	(0.006)	(0.045)	(0.007)
South X Cohort5153	0.089**	0.011	0.061*	-0.010
	(0.037)	(0.008)	(0.033)	(0.011)
South X Cohort5456	0.095***	0.021**	0.101***	-0.000
	(0.035)	(0.009)	(0.030)	(0.010)
South X Cohort5759	0.110**	0.014	0.092**	-0.019*
	(0.044)	(0.011)	(0.040)	(0.010)
R-squared	0.106	0.122	0.082	0.108
Place of Birth	YES	YES	YES	YES
Year of Birth	YES	YES	YES	YES
Controls	YES	YES	YES	YES
Observation	56,919	559,367	54,756	506,184

Note: Number in the parentheses is the standard error clustered by the place of birth. *** indicates 1% significance level; ** indicates 5% significance level; * indicates 10% significance level. Regressions are weighted by sample weights. Controls include education, occupation and industry.

Table 14 Estimation Considering State Labour Supply by Regional Subgroup

	1990		2000	
	Black	White	Black	White
State Labour Supply	0.015	0.002	-0.000	-0.001
	(0.016)	(0.006)	(0.009)	(0.007)
High X Cohort4850	0.053	-0.005	0.066	-0.005
	(0.038)	(0.008)	(0.041)	(0.011)
High X Cohort5153	0.096**	-0.002	0.091**	0.003
	(0.041)	(0.009)	(0.036)	(0.016)
High X Cohort5456	0.092**	0.004	0.131***	0.017
	(0.034)	(0.013)	(0.026)	(0.012)
High X Cohort5759	0.119**	0.006	0.104**	-0.018
	(0.047)	(0.008)	(0.041)	(0.015)
Mid X Cohort4850	0.100***	0.017**	-0.031	-0.004
	(0.036)	(0.006)	(0.051)	(0.008)
Mid X Cohort5153	0.082*	0.019*	0.025	-0.018
	(0.044)	(0.010)	(0.042)	(0.011)
Mid X Cohort5456	0.099**	0.033***	0.065	-0.012
	(0.047)	(0.010)	(0.041)	(0.010)
Mid X Cohort5759	0.100**	0.019	0.078	-0.019
	(0.046)	(0.016)	(0.054)	(0.012)
R-squared	0.106	0.122	0.082	0.108
Place of Birth	YES	YES	YES	YES
Year of Birth	YES	YES	YES	YES
Controls	YES	YES	YES	YES
Observation	56,919	559,367	54,756	506,184

Note: Number in the parentheses is the standard error clustered by the place of birth. *** indicates 1% significance level; ** indicates 5% significance level; * indicates 10% significance level. Regressions are weighted by sample weights. Controls include education, occupation and industry.

Appendix

Table A1 Descriptive Statistics of Wage by Regional Subgroup and Cohorts

Panel A Black									
Year	1980			1990			2000		
Cohort	High	Non-South	Diff	High	Non-South	Diff	High	Non-South	Diff
4547	15.2	18.9	-3.7	16	22.1	-6.1	17.8	23.9	-6.1
4850	14.1	17.1	-3.0	15.7	20.9	-5.2	18.6	23.4	-4.8
5153	12.5	15.1	-2.6	14.8	19.1	-4.3	18.0	22.2	-4.2
5456	10.8	12.3	-1.5	13.5	17.6	-4.1	17.1	20.7	-3.6
5759	7.8	8.4	-0.6	12.5	15.6	-3.1	15.8	19.6	-3.8
Panel B White									
Year	1980			1990			2000		
Cohort	High	Non-South	Diff	High	Non-South	Diff	High	Non-South	Diff
4547	22.7	25.2	-2.5	26.5	29.9	-3.4	28.6	31.2	-2.6
4850	20.9	22.5	-1.6	25.4	28.5	-3.1	29.3	31.2	-1.9
5153	18.3	19.6	-1.3	23.8	26.5	-2.7	28.3	30.4	-2.1
5456	15.1	15.9	-0.8	22.1	24.7	-2.6	27.5	29.7	-2.2
5759	11.0	10.9	0.1	19.9	22.6	-2.7	25.9	29.0	-3.1
Panel C Black									
Year	1980			1990			2000		
Cohort	Mid	Non-South	Diff	Mid	Non-South	Diff	Mid	Non-South	Diff
4547	16.3	18.9	-2.6	17.3	22.1	-4.8	19.7	23.9	-4.2
4850	14.9	17.1	-2.2	16.8	20.9	-4.1	19	23.4	-4.4
5153	13.7	15.1	-1.4	16.0	19.1	-3.1	18.8	22.2	-3.4
5456	11.4	12.3	-0.9	14.6	17.6	-3.0	18.1	20.7	-2.6
5759	8.0	8.4	-0.4	13.1	15.6	-2.5	17.1	19.6	-2.5
Panel D White									
Year	1980			1990			2000		
Cohort	Mid	Non-South	Diff	Mid	Non-South	Diff	Mid	Non-South	Diff
4547	22.7	25.2	-2.5	25.8	29.9	-4.1	28.8	31.2	-2.4
4850	20.4	22.5	-2.1	25.1	28.5	-3.4	29	31.2	-2.2
5153	18.3	19.6	-1.3	23.7	26.5	-2.8	28.1	30.4	-2.3
5456	14.9	15.9	-1.0	21.9	24.7	-2.8	27.4	29.7	-2.3
5759	10.7	10.9	-0.2	19.8	22.6	-2.8	26.3	29.0	-2.7

Notes: This table reports mean wages by pooled 3-year age cohorts for Black and White men over 1980, 1990 and 2000 Census waves. Units are given in thousands of dollars and wages have been deflated by the US consumer price index (1982-1984==100). "High" refers to the formerly high slavery states. Middle refers to the formerly middle slavery states.

Table A2 DDD Estimation

Year	1980	1990	2000
B-W X South X Cohort48-50	0.001	0.068*	0.035
	(0.031)	(0.035)	(0.044)
B-W X South X Cohort51-53	-0.022	0.089**	0.072**
	(0.030)	(0.039)	(0.033)
B-W X South X Cohort54-56	0.018	0.077**	0.109***
	(0.029)	(0.036)	(0.031)
B-W X South X Cohort57-59	0.040	0.103**	0.112***
	(0.037)	(0.043)	(0.041)
R-squared	0.208	0.161	0.133
Place of Birth	YES	YES	YES
Year of Birth	YES	YES	YES
Controls	YES	YES	YES
Observation	753,534	653,037	592,913

Note: Number in the parentheses is the standard error clustered by the place of birth. *** indicates 1% significance level; ** indicates 5% significance level; * indicates 10% significance level. Regressions are weighted by sample weights. Controls include education, occupation and industry.

Table A3 DDD Estimation by Regional Subgroup

Year	1980	1990	2000
B-W X High X Cohort48-50	-0.003	0.064	0.078*
	(0.029)	(0.040)	(0.041)
B-W X High X Cohort51-53	-0.029	0.110**	0.090**
	(0.035)	(0.045)	(0.037)
B-W X High X Cohort54-56	0.019	0.090**	0.124***
	(0.032)	(0.039)	(0.031)
B-W X High X Cohort57-59	0.057	0.121**	0.126***
	(0.051)	(0.046)	(0.043)
B-W X Mid X Cohort48-50	0.003	0.082**	-0.016
	(0.040)	(0.036)	(0.050)
B-W X Mid X Cohort51-53	-0.009	0.069	0.044
	(0.036)	(0.042)	(0.037)
B-W X Mid X Cohort54-56	0.017	0.068	0.085**
	(0.037)	(0.046)	(0.038)
B-W X Mid X Cohort57-59	0.015	0.086*	0.098*
	(0.036)	(0.044)	(0.053)
R-squared	0.209	0.161	0.133
Place of Birth	YES	YES	YES
Year of Birth	YES	YES	YES
Controls	YES	YES	YES
Observation	753,534	653,037	592,913

Note: Number in the parentheses is the standard error clustered by the place of birth. *** indicates 1% significance level; ** indicates 5% significance level; * indicates 10% significance level. Regressions are weighted by sample weights. Controls include education, occupation and industry.

Table A4 DID Estimation By Using Continuous Slavery Ratio

	Black		White	
Year	1990	2000	1990	2000
Slavery X Cohort4850	0.173**	0.104	0.014	-0.013
	(0.077)	(0.100)	(0.016)	(0.018)
Slavery X Cohort5153	0.265***	0.196**	0.006	-0.014
	(0.067)	(0.078)	(0.022)	(0.026)
Slavery X Cohort5456	0.231***	0.275***	0.027	0.009
	(0.066)	(0.070)	(0.025)	(0.024)
Slavery X Cohort5759	0.302***	0.202**	0.015	-0.058**
	(0.089)	(0.093)	(0.027)	(0.026)
R-squared	0.108	0.083	0.131	0.110
Cohort Effect	YES	YES	YES	YES
Education	YES	YES	YES	YES
Occupation	YES	YES	YES	YES
Industry	YES	YES	YES	YES
Observation	57,646	55,181	595,391	537,732

Note: Number in the parentheses is the standard error clustered by the place of birth. *** indicates 1% significance level; ** indicates 5% significance level; * indicates 10% significance level. Regressions are weighted by sample weights. Controls include education, occupation and industry.

Table A5 DID Estimation By Using Continuous Political Competition

	Black		White	
Year	1990	2000	1990	2000
(Political Competition) X Cohort4850	-0.220	-0.228	0.009	0.020
	(0.187)	(0.163)	(0.035)	(0.052)
(Political Competition) X Cohort5153	-0.375**	-0.233	-0.003	0.022
	(0.169)	(0.154)	(0.044)	(0.070)
(Political Competition) X Cohort5456	-0.328**	-0.555***	-0.089*	-0.027
	(0.158)	(0.121)	(0.046)	(0.055)
(Political Competition) X Cohort5759	-0.425**	-0.301	-0.042	0.085
	(0.191)	(0.187)	(0.050)	(0.069)
R-squared	0.108	0.083	0.131	0.110
Cohort Effect	YES	YES	YES	YES
Education	YES	YES	YES	YES
Occupation	YES	YES	YES	YES
Industry	YES	YES	YES	YES
Observation	57,646	55,181	595,391	537,732

Note: Number in the parentheses is the standard error clustered by the place of birth. *** indicates 1% significance level; ** indicates 5% significance level; * indicates 10% significance level. Regressions are weighted by sample weights. Controls include education, occupation and industry.

Chapter 2 Hate Crime and Victory of Obama

1. Introduction

Hate crime, motivated by racial, sexual or other prejudices, may occur in the context of an increase in tension or conflict among different social groups, and can undermine social cohesion and integration.[27] At worst, hate crimes may involve property damage or physical violence.[28] Among race incidents in the US, the majority have been perpetrated against black people, who form the largest racial minority in the US.[29] Figures 1 to 3 show the patterns of total, anti-black only, and anti-white only hate crimes in the US from 2000 to 2012. The figures display a clear fall in total and anti-black hate crimes other than anti-white hate crime after Democratic candidate Barack Obama won the US presidential election in November 2008.

[Figure 1 here]

[Figure 2 here]

[Figure 3 here]

Obama's election win was considered a triumph along the path of reducing inequality and empowering the black community. A common recent perception is that Obama's presidency led to a lessening of black-white tensions. In fact, laboratory-based studies such as Plant et al. (2009) and Columb and Plant (2011) indicate that exposure to Obama, a positive counter-stereotype exemplar, has decreased whites' prejudice against black people. In addition, Welch and Sigelman (2011) draw a similar conclusion from American National Election

[27] The legal definition of hate crime as provided by the FBI is that "a hate crime as a criminal offense against a person or property motivated in whole or in part by an offender's bias against a race, religion, disability, sexual orientation, ethnicity, gender, or gender identity." The measurement of hate crime used in this paper is hate crime incidents per 100,000 persons.

[28] There are lots of examples, ranging from Hindu-Muslim riots in India in 1980s, to more recent Buddhist-Muslim riots in Myanmar and the Charlottesville riots in the US in 2017.

[29] From FBI Statistics from 2005 to 2012: about 53 percent of hate crimes were motivated by racial bias; among the racial biased hate crimes, about 69 percent were triggered by anti-black bias.

Studies. Given the previous findings, I use hate crime data to test whether Obama's win in the 2008 election had a significant impact on total and anti-race hate crime in the US.

To explore this idea, I use the variation in hate crimes across different political regions before and after Obama's win. To identify the political regions, I classify States into "Blue States", which supported a Democratic candidate in the presidential election of 2008, and "Red States", which supported a Republican presidential candidate in 2008. This classification captures the political, economic and demographic differences between Blue and Red States. For instance, Blue States generally have stronger economies than Red States.[30] Accordingly, this paper focuses on whether total and anti-race hate crimes, particularly anti-black crime, exhibit a different pattern between Blue and Red States after Obama came to power.

I argue that after Obama's win, anti-black and total hate crimes declined relatively more in Blue States than in Red States. Since Obama was from the Democratic Party, his salient and successful example is likely to have changed how black people are perceived by white people in Blue States, leading to greater tolerance and respect. I would refer to this effect as Obama Effect. As a result, anti-black hate crime would fall. Furthermore, total hate crime would also fall because the majority of hate crimes are those perpetrated against black people. On the other hand, in Red States Obama's victory might not affect negative attitudes about black people, because Obama was from the opposing party. In addition, the Tea Party Movement (hereafter, 'TPM'), which emerged shortly after Obama's victory in the 2008 election and has been associated with the Republican Party, organised a series of protests against Obama's administration. Studies (e.g. Knowles et al. (2013), Tope et al. (2015)) show that racial resentment and racial prejudice are highly associated with this movement. This suggests that the TPM might weaken the Obama Effect in Red States. Consequently, anti-black and total hate crimes would not decrease in those States.

Moreover, among Blue and Red States, there exist States that supported the Democratic Party in both the 2004 and the 2008 presidential election (hereafter, 'Democratic Party Always States'), States that switched political party preference (hereafter, 'Swing States'), and States that always supported the Republican Party (hereafter, 'Republican Party Always States'). Thus, this paper will further argue that anti-black and total hate crimes would exhibit a significant drop in the Democratic Party Always States rather than the Swing States. Hate crimes in Swing States might not be affected as much by the Obama Effect since the

[30] Shin and Webber (2014) discuss details about the difference between Blue and Red States.

number of people who supported the Democratic Party and Republican Party was similar for both.

Practically, my empirical design utilizes the sample of monthly hate crime data for each State reported by the FBI between 2005 and 2012. I use a simple difference-in-differences (DID) approach. The advantage of the DID approach is that it can rule out the level difference across the groups and show how hate crimes in Blue States behaved differently to those in Red States during Obama's presidency. The empirical results indicate that total and anti-black hate crimes significantly declined in Blue States relative to Red States after 2008. The results also show that relative to the Republican Party Always States, there was a significant decline in both total and anti-black hate crimes in the Democratic Party Always States.

In addition, I examine which factors such as black-white education ratio, the proportion of black people, GDP per capita, and the number of police, play a role in the observed decline in total and anti-black hate crimes. The results show that the black-white education ratio, more than any other factor, may explain the decline in anti-black and total hate crimes in Democratic Party Always States.[31] Therefore the Obama Effect is stronger in Democratic Party Always States and is associated with a higher black-white education ratio.

However, the findings above may be related to two alternative possible explanations. Firstly, the results could have been driven by the switch from a Republican (Democratic) to a Democratic (Republican) president as a new president might put efforts to reduce the hate crime rate to signal the citizens that the alleviation of racial or gender conflicts. Regarding this concern, I consider hate crimes under each of the political parties between 1997 and 2004, which also saw a party alternation, compared to the period between 2005 and 2012.[32] The results indicate that relative to the States that supported the Republican Party during this period, there was no significant change in hate crimes in the States that supported the Democratic Party and the Swing states after Bush won the election in 2000. Second, the previous results may be because of a shift in the attitudes of police towards race or reporting crime. Regarding the police's racial attitude, DellaVigna (2010) indicates that Obama Effect did not have any effect on it. As for the police's attitude towards reporting crime, if this were

[31] In this paper, the black-white education ratio is measured by the proportion of well-educated population among black people and the proportion of well-educated population among white people. The well-educated population refers to the people whose educational attainments at 12th grade and higher. The higher ratio implies a lower education gap between blacks and whites.

[32] Between 1997 and 2004, Presidents Bill Clinton and George Bush were from different political parties and were both white. Thus, the examination of hate crimes during this period can show the effect of political alternation on hate crimes.

the case, we shall expect that the change of police's attitudes towards the crime reporting could not only affect hate crime records but also violent crime, and property crime. To examine this concern, I adopt other types of crimes such as violent and property crimes, between 2005 and 2012. From the empirical results, I do not observe any clear change in pattern for these crimes in the Democratic Party Always States. Therefore, taken together, the decline in hate crime, particularly the total and anti-black type, after the 2008 presidential election can be seen as due to the Obama Effect.

This paper adds to the psychology and sociology literature that discusses the impact of the Obama Effect on the perception of blacks by whites in the US (e.g. Plant et al. (2009); Columb and Plant (2011); Welch and Lee (2011)). This study extends the literature on the relationship between economic outcomes and the Obama Effect (e.g. Marx et al. (2009); DellaVigna (2010)). In addition, This paper also contributes to the growing body of hate crime research, which tends to examine which factors (such as hate group or terror attacks) may affect hate crime propagation (e.g. Ryan and Leeson (2011); Hanes and Machin (2014)). In particular, this study considers the relationship between the Obama Effect and hate crimes. Distinct from the studies that find no Obama Effect on economic outcomes (e.g. DellaVigna (2010)), this paper confirms that Obama's win did cause total and anti-black hate crimes to decline, particularly in the States where the majority supported Obama in the election.

The paper proceeds as follows. Section 2 reviews related literature. Section 3 describes relevant issues in the lives of black people in the US. Section 4 discusses the development of related hypotheses. Section 5 discusses the data and empirical model specification. Section 6 discusses the empirical findings and Section 7 concludes.

2. Related Literature

This study relates to the literature on whether the election of Obama as President changed whites' perceptions of black people, or economic outcomes for black people. Regarding the literature about whether exposure to Obama can result in a decline in anti-black prejudice by white people, laboratory-based studies do find a positive impact on racial attitudes. For instance, Plant et al. (2009) find that participants who hold Obama in mind as a role model, either as a positive black exemplar or political figure (a president), may show a dramatic reduction in implicit anti-black prejudice. Columb and Plant (2011) also confirm that participants who were exposed to negative black exemplars and then Obama show a decrease in implicit racial bias relative to those in negative exemplars only condition. In addition to

the laboratory-based findings, Welch and Sigelman (2011) utilize data from American National Election Studies (ANES) and find that negative stereotypes of blacks were weaker among younger whites under the election of Obama. This finding implies that the stereotype could continue to disappear in the future.

The Obama Effect may also influence economic outcomes for black people. For example, it could increase academic performance by counteracting internalised negative stereotypes in black people (Steele and Aronson (1995)). Marx et al. (2009) find the Obama Effect is beneficial for academic performance among black people because it reduces the negative effects of stereotype threat. DellaVigna (2010) utilizes an event study approach to examine if the Obama Effect affects the crime rate and police attitudes. His findings suggest that there exists no significant impact on economic outcomes for blacks such as changes to the crime rate. As for the examination of police attitudes, he examines racial profiling by the police at traffic stops and finds no change. Overall, the author concludes that the Obama Effect may not change economic outcomes.

Besides the study about the Obama Effect on racial attitudes and economic outcomes, this paper is also linked to the literature that examines which factors may be related to hate crimes. For instance, Ryan and Leeson (2011) study the relationship between hate groups and hate crimes. However, they find no correlation between hate groups and hate crimes. Hanes and Machin (2014) evaluate the effect of exogenous terror attacks such as the July 2005 terror attack in London and the September 2001 terror attack in the US on hate crime in the UK. They show that these terror attacks increased hate crimes against Asians and Arabs in the UK. The authors argue that the findings may be driven by changes in attitudes towards groups such as British Muslims, as a result of media coverage.

3. Black people in the US

Before discussing how changes in hate crimes in US States could be associated with different political preferences, I briefly discuss the current circumstances of black people in the US.

Average income and educational attainment in the US is lower among black people than white people. This racial inequality can be directly traced to black slavery in the US South

in the 19th Century (e.g. Bertocchi and Dimico (2014)).[33] Even after the Civil War and the end of slavery, black people continued to be oppressed via race discrimination in education, labour and politics. For example, the Black Codes in the South prevented black people from easily moving to other States; Jim Crow laws, although designated "separate but equal", institutionalised discrimination in job searches, education and transportation.

Things changed after significant events such as World War I, the Great Depression and World War II. These events weakened the resolve of whites in the South to impede progress for blacks (Acemoglu and Robinson (2006)). Moreover, the Civil Rights movement during the 1950s and 1960s increased black activism towards achieving equality. This movement drove the US Government to finally implement laws, such as the Civil Rights Act of 1964 and the Voting Rights Act of 1965, to reduce labour market discrimination and increase political participation.

Studies have documented the decline of black-white wage gap as a result of these changes (e.g. Donohue and Heckman (1991); Card and Krueger (1992); Ashenfelter et al. (2006); Chay et al. (2014); Cheng (2017b)). However, conflicts between blacks and whites may prevail because of persistent negative racial stereotypes, leading to tension and in some cases, violence. Obama's historic victory in 2008, becoming the first African-American president was an opportunity to change racial attitudes towards black people and bring about a decline in race crimes, especially those perpetrated against black people by white people.

4. Hypothesis Development

In this section I develop a hypothesis about that how Obama's win might have changed the pattern of hate crimes across States with different political leanings.

4.1 Blue and Red States

4.1.1 Anti-Black and Total Hate Crimes

Finn and Glaser (2010) indicate that the most influential predictor of vote choice in the 2008 US presidential election was party identity. In addition, studies such as Mas and Moretti (2009), Bullock (2010) and Weisberg (2015) point out that there exists little evidence that

[33] After three centuries of slavery in the US, northern objections to this practice triggered the Civil War between the South and North, which started in 1861 and lasted till 1865. In 1865, the North defeated the South and slavery was abolished.

racial attitudes could have played a major role in the 2008 presidential election. Weisberg (2015) further indicates that the reason why Obama lost votes in 2008 is because of bad economic conditions at that time. Accordingly, people chose which candidate to vote for mainly because of their own political preferences, and not candidate characteristics such as race.[34]

However, after the election, Obama's race may have played a role in changing racial attitudes towards black people, particularly in the Blue States. This phenomenon, where people change their attitudes to bring their view into line with the current leadership of the party they are aligned with, can be observed across many political evolutions. For example, historically it was the Southern Democrats who supported slavery and segregation, and Republicans who led the push to eliminate it: when the Republican leadership shifted their position, the views of their voters followed. Similarly, the election of a black Democratic President shifted attitudes towards black people, especially among Democrat voters. Using US General Social Survey data, Figure 4 shows that Democrats thought that blacks had a better work attitude after 2008, but Republicans did not.[35] [36] In line with the findings from previous literature (e.g. Plant et al. (2009), Columb and Plant (2011)), this finding may suggest that Obama being the first black president affected the white's negative black stereotypes, encouraging a more respectful and tolerant attitude among white Democrat voters. Therefore, we would expect to see a reduction in the anti-black hate crimes in Democratic States (Blue States) and, since anti-black hate crime forms the majority of total hate crime incidents, we expect that the total hate crime rate would also fall following Obama's victory.

[Figure 4 here]

[34] Although there may have been some concern that the voters' decision in the 2008 US presidential election was affected by the Obama's racial identity, this paper will follow the argument of Mas and Moretti (2009), Bullock (2010) and Weisberg (2015) and then assume that Obama's racial identity played no role in the voters' decision in 2008.

[35] The General Social Survey is a national representative survey, which has tracked societal changes in the US such as the pattern of racial attitudes, since 1972.

[36] The lower index implies that black people work harder. Figure A1 shows that how black people thought of whites' work attitudes. One can observe that different to white people, both black democrats and republicans thought whites were lazier after Obama won the election.

As for white people in Red States, Obama's win might not affect much their perception of black people. This is because Obama is not from the party that they supported, so the race of the new President is not so relevant to them. Figure 4 shows that the republicans thought that black peoples were lazier after 2008. Moreover, the TPM was mainly opposed to the Obama Administration, and mostly supported Republican candidates for office (e.g. Madestam, et al. (2013)).[37] Skocpol and Williamson (2012) also indicate that most Tea Party activities were observed in the Red States. Studies such as Knowles et al. (2013) and Tope et al. (2015) further point out that the anti-minority attitude, particularly anti-black, is highly associated with TPM membership. Due to these anti-Obama factors, the Obama Effect could not have a significant influence on white Republicans' perceptions. Therefore, there is unlikely to be a clear decline in the anti-black and total hate crimes in Red States.[38] As a result, we should observe that the total and anti-black hate crimes in Blue States relative to Red States exhibited a significant decline after Obama's victory.

4.1.2 Anti-White Hate Crime

The Obama Effect is unlikely to shift anti-white hate crime in Blue States relative to Red States. Anti-white hate crime has been low in both Blue and Red States, and as the economically and socially powerful majority, white people are less likely to be the target of hate crimes. Therefore, there would not exist a clear decline in the anti-white hate crime in Blue States relative to Red States after Obama came to power.

4.2 Democratic, Swing, and Republican

With respect to hate crime pattern in the Democratic Party Always States, Swing States and Republican Party Always States after Obama came to power, I argue that anti-black and total hate crimes might not change much in Swing States relative to Republican Party Always States after Obama's win. This is because Swing States had a similar voting share between

[37] TPM could affect white people's behaviour in both Blue and Red States. However, its effect should be higher in Red States since the TPM was mainly against Democratic Party policies. In the appendix, Figures A2 and A3 show the average number of Republican politicians associated with the TPM. Relative to Blue (or Democratic Party Always) States there are more politicians who are affiliated with the TPM in Red (or Republican always) States.

[38] These anti-Obama factors might not affect people much in the Blue States since the most people there are pro Democratic Party.

the Democratic Party and the Republican Party: anti-Obama factors such as TPM could still play a role in affecting the white's racial attitudes towards black people in these States.[39] Therefore, there would not be an observable decline in the anti-black and total hate crimes in Swing States relative to Republican Party Always States after Obama' win. As for hate crimes in the Democratic Party Always States, similar to the argument in section 4.1.1, one would anticipate a clear decline in the anti-black as well as in total hate crimes relative to Republican Party Always States after Obama's victory. Following the argument in section 4.1.2, one would also expect that relative to Republican states, the anti-white hate crime would have no change in the Democratic Party Always States and Swing States after Obama's win.

5. Data and Empirical Model

5.1 Hate Crime Data

This study uses data from the FBI's Uniform Crime Report (UCR), which was created under the Hate Crime Act of 1990. This Act requires the Attorney General to collect monthly data on crimes showing evidence of racial, religion, sexual orientation, or ethnic prejudices.[40] In this study, I mainly consider the total, anti-black and anti-white hate crimes for each State from 2005 to 2012. The total hate crime rate refers to hate crime incidents motivated by all possible prejudices, per 100,000 population. The anti-black and anti-white hate crimes rates are incidents against black people and white people per 100, 000 population, respectively.[41]

5.2 Descriptive Statistics

5.2.1 Blue vs Red States

Figure 5, Figure 6, and Figure 7 demonstrate the pattern of total, anti-black and anti-white hate crimes in the Blue and Red States from 2005 to 2012, respectively. These figures firstly show that total and anti-black hate crimes are higher in the Blue States than the Red States.

[39] In the Swing States the average voting share of Democratic Party and Republican Party in 2008 was about 53 % and 46%, respectively.

[40] The FBI works closely with state authorities to investigate hate crimes. When the investigation is complete, the FBI forwards the results to local U.S. Attorneys' Offices and the Civil Rights Division at the Department of Justice, which decides whether a federal prosecution is warranted. Details are at: https://www.fbi.gov/investigate/civil-rights/hate-crimes.

[41] The formula of hate crime rate is as follows. State hate crime=(State hate incidents)/(State population)*10^5.

Moreover, in Figure 5 and Figure 6 we observe a clear decline in total and anti-black hate crime in Blue States but not in Red States after the 2008 election. Figure 7 shows that there is no difference in anti-white hate crime between Blue and Red States.

[Figure 5 here]

[Figure 6 here]

[Figure 7 here]

Table 1 shows the descriptive statistics of different types of hate crimes across regions and periods. In line with the information in Figure 5-7, total and anti-black hate crimes are always higher in Blue States compared to Red States. The reasons why Blue States exhibit a higher hate crime rate than Red states could be the demographic difference that exists between these two groups. For example, this may be due to a higher population density in Blue States relative to Red States.[42] The difference in total hate crime between Blue and Red States before Obama came to power was 0.078. It then declined to 0.040 after Obama's win. For anti-black hate crime, the differences were 0.031 before and 0.014 after Obama's win. Anti-white hate crime was slightly higher in Red States than Blue States before and after Obama was in power. The differences were -0.010 and -0.011, respectively.

[Table 1 here]

Table 2 contains descriptive statistics for economic development, demographics, education and law and enforcement in Blue and Red States from 2005 to 2012. Relative to Red States, Blue States have higher GDP per capita, suggesting better economic conditions in Blue States. Blue States have a slightly lower proportion of males and a higher population density than Red States. Both of them have a similar proportion of black people. The ratio

[42] From our sample, the correlation between hate crime and population density is about 0.3535. The population densities of Blue and Red States are 609 persons per square mile and 66 persons per square mile.

of proportion of black and proportion of white whose education attendance at 12th grade and higher is lower in Blue than Red States, suggesting that racial educational inequality is higher in the Blue States. Regarding law and enforcement, which is measured by the number of police per 1,000 population, there exists no significant difference between Blue and Red States.

[Table 2 here]

5.2.2 Democratic vs Swing vs Republican States

This section discusses the descriptive statistics of the Democratic Party Always, Swing, and Republican Party Always States between 2005 and 2012. Figure 8, Figure 9, and Figure 10 demonstrate the pattern of total, anti-black and anti-white hate crimes among them, respectively. Total and anti-black hate crimes are higher in the Democratic Party Always States than in the Swing and Republican Party Always States. Moreover, there is no difference in anti-white hate crime in the three groups. In addition, the total and anti-black hate crimes declined substantially in the Democratic Party Always States relative to the Swing and Republican Party Always States after Obama's win.

[Figure 8 here]

[Figure 9 here]

[Figure 10 here]

Table 3 shows hate crime statistics across the three political groups. Total and anti-black hate crimes are higher in the Democratic Party Always States than in the Swing or Republican Party Always States. However, the anti-white crime rate is similar among all three political groups. Comparing hate crimes before and after Obama's win, there was a

significant drop in total and anti-black hate crimes in the Democratic Party Always States after Obama's win.

[Table 3 here]

Table 4 shows the descriptive statistics of other characteristics. The economy in Democratic Party Always States is better than in others, and the proportion of the black population is slightly higher in the Democratic Party Always States than in others. The proportion of male population is higher in the Swing and Republican Party Always States than in the Democratic Party Always States, while the highest population density is in the Democratic Party Always States. Regarding the black-white education ratio, the ratio is higher in the Republican Party Always States than in others. As a measure of law and enforcement, the number of police per 1,000 population is higher in the Democratic Party Always States than in others.

[Table 4 here]

5.3 Empirical Model

I implement a basic difference-in-differences (DID) approach, using the following empirical model,[43]

$$\log(1 + Hate)_{smy} = \alpha + \gamma_s + \gamma_{my} + \delta(P \times B) + X_{sy}\beta + \varepsilon_{smy} \qquad (1)$$

where s is state, m is month, y is year, $Hate$ represents hate crime such as total, anti-black or anti-white hate crime, P indicates the period after Obama's win (November 2008), B is the Blue State dummy and X is a vector of controls including GDP per capita, proportion of black population, proportion of male population, black-white education ratio, population density and number of police.[44] The parameter of main interest, δ, measures how hate crime in Blue States changes relative to Red States before and after Obama's win. Following the

[43] See d'Este (2017) for another example, I use the functional form, $\log(1 + x)$, for the dependent variable.
[44] Instead of using a dummy variable that represents the Blue states, one can also use the voting share of Democratic Party in 2008 presidential election in the analysis.

argument regarding the Obama Effect, we should expect δ to be negative and significant in the total and anti-black hate crimes.

I extend model (1) by considering the case of the three political groups. The revised model is as follows.

$$\log(1 + Hate)_{smy} = \alpha + \gamma_s + \gamma_{my} + \sum_{k=1}^{2} \delta_k (P \times T_k) + X_{sy}\beta + \varepsilon_{smy} \qquad (2)$$

, where T_1 represents Democratic Party Always States and T_2 represents Swing States. The definitions of other variables are the same as in the baseline model. The coefficients of main interest in this regression are $\delta_k, k = 1,2$, which measures the changes in hate crimes in Democratic Party Always States and Swing States relative to the Republican Party Always States before and after Obama came to power. Again, we should expect that the total and anti-black hate crimes in the Democratic Party Always States would have a significant decline relative to the Republican Party Always States after Obama's win. Finally, please note that the level differences in hate crime across these groups are necessarily differenced out as part of the DID model. That is, the level differences in hate crimes in different groups would not affect the estimation results. Hence, the δ and δ_k parameters in model (1) and (2) can capture the post-Obama differential shift in the level of hate crime.

6. Empirical Results

This section discusses the results of the empirical models. In the baseline results, I will show the results regarding the two or three political groups' samples and see if the results are consistent with the hypothesis. In the heterogeneity analysis, I mainly focus on the sample of three political groups to examine which factors such as black-white education ratio, proportion of black population, number of police, and GDP per capita may affect hate crime after Obama's win. Since there may exist other possible explanations for the findings, I will again use the sample of three political groups to examine whether the possible explanations can drive the main findings.

6.1 Baseline Results

6.1.1 Results with no Fixed Effect

Table 5 and Table 6 show the estimation results of model (1) and model (2) without the fixed effects. From Table 5, we can observe that the interaction coefficient is negative across these three types of hate crimes. Although most of the estimates are not significant, we still can observe that the magnitudes of coefficients are larger in the total and anti-black hate crime sample than in the anti-white hate crime sample. This may imply that that relative to the Red States, total and anti-black hate crimes could decline after Obama won the election. Regarding the results from Table 6, one can see the relative to the Republican Party Always States, the total and anti-black hate crime declined significantly in the Democratic Party Always States when considering other control variables in the estimation.

[Table 5 here]

[Table 6 here]

6.1.2 Results with Fixed Effect

6.1.2.1 Blue vs Red States

Table 7 shows the baseline empirical results of model (1). We can observe that the coefficients of main interest are negative and significant in the total and anti-black hate crimes but not in the anti-white hate crime sample. This suggests that total and anti-black hate crimes in the Blue States declined significantly after Obama won the 2008 election. As for the magnitudes of coefficients, we can find, for example, that the estimates from model with controls are about 3.7 % and 1.7%, respectively.[45][46]

[Table 7 here]

[45] As there may exist different trends in reporting hate crime between Blue and Red states, I consider the inclusion of group specific trends in the analysis. The results as shown in Table A1 are similar to the findings in Table 7. Note that the magnitudes of coefficients in the anti-black hate crime model across the trend and non-trend cases are similar to each other. But, the overall estimate becomes less significant in the model with trend because the standard error increases (from 0.008 to 0.011). However, the model for total hate crimes remains significant with the coefficient not changing across the two types of model.

[46] Instead of using the log (1+hate) functional form, I also use hate crime rate as a dependent variable in the analysis. The estimation results reported in Table A2 are similar to those found in Table 7. In addition, I also estimate models that use the state Democratic voting share in 2008 presidential election as a measure of treatment intensity in the DID estimation. The results for this model are shown in Table A3 and Table A4 are consistent with the main findings from the paper.

6.1.2.2 Democrat Always vs Swing vs Republican Always

Table 8 contains the results for the sample of three political groups: Democratic Party Always, Swing and Republican Party Always States. The findings indicate that relative to Republican Party Always States, there exists a significant decline in total and anti-black hate crimes in Democratic Party Always States after Obama's win. The magnitudes of estimates from the model with controls are about 4.7 % and 2.3 %, respectively. Furthermore, there is no significant drop in anti-white hate crime in the Democratic Party Always and Swing States relative to the Republican Party Always States.[47][48]

[Table 8 here]

6.2 Heterogeneity Analysis

In this section I discuss which variables, such as black-white education ratio, proportion of black population, number of police, and GDP per capita, play a role in the decline in hate crime after Obama's win. These four variables represent different State characteristics. The black-white education ratio measures relative social and economic status. A higher ratio implies that the economic and social status between blacks and whites is closer. The proportion of black population may represent the collective power of blacks in each state. The number of police and GDP per capita can be proxies for general law and enforcement, and economic conditions in each state, respectively. I use the sample of three political groups and implement a triple difference (DDD) to do the analysis. The results from Table 9 show that the black-white education ratio may be more influential than other variables in the decline in total and anti-black hate crime in the Democratic Party Always States.

[Table 9 here]

[47] As for the three group case, the findings reported in Table A5 are similar to the findings in Table 8. Moreover, similar to the findings from Table A1, one can also observe the standard error from the anti-black hate crime model with trend is larger than the anti-black hate crime model without trend.

[48] The hate crime rate is also used as a dependent variable in the analysis and the results are shown in Table A6. Again, the results are similar to the findings from Table 8.

6.3 Some Concerns

There are alternative explanations for the findings above. For instance, the previous results could be driven by the political alternation, since changing the political party in power might shift attitudes towards hate crime. Moreover, the previous findings could be due to a change in police practices regarding the report of criminal incidents. Below I discuss whether the previous findings are attributable to these alternative explanations.

6.3.1 Political Alternation

Did changing from a Republican (Democratic) to a Democratic (Republican) President change racial attitudes? If this were the case, we should observe a change in the incidence of hate crime every time a new president was elected whose ideology was different to that of the previous president. Between 1997 and 2004 the US was led by presidents from different political parties, so I use this period to examine whether hate crime incidence changed in the Democratic Party Always or Swing States during this period after the new president (Bush, Republican) came to power.[49] The results, shown in Table 10, indicate that there existed no significant change in hate crime in the Democratic Party Always or Swing States relative to the Republican Party Always States after Bush's election. Hence, these findings suggest the results from the sample between 2005 and 2012 are unlikely to have been caused by the changing from a Republican to a Democratic president.

[Table 10 here]

6.3.2 Police Attitudes

The other concern is that the decline in hate crime after Obama came to power may be due to a shift in police behaviour related, for example, to changes of racial attitude or attitude towards reporting crimes. In fact, DellaVigna (2010) examines whether racial profiling by

[49] Here, the Democratic (Republican) Party Always States are the States that supported Democratic (Republican) Party in 1996 and 2000 presidential election. The Swing States are the States that changed their political party support in 1996 and 2000 election.

the police in traffic stops was changed by the Obama Effect. His empirical findings indicate that Obama Effect might not play a role in the police's racial attitude. The findings from DellaVigna (2010) therefore provide us an important piece of evidence that the attitudes of police towards the race did not change even if Obama won the election. However, if the attitude of police to criminal behaviours did change due to other unobservable factors such as the process of reporting crime, one might expect that other types of crimes such as violent or property crimes in the Democratic Party Always or Swing States would also have changed significantly after Obama's win. Thus, to further examine this concern, I use state level violent and property crimes to examine this concern. The results in Table 11 show that there was no significant change in violent and property crime in the Democratic Party Always or Swing States relative to the Republican Party Always States after Obama came to power. Moreover, I utilize different types of violent and property crimes to see if they would change after Obama's win. Again, results in Table 12 and 13 suggest that there is no differential effect for the Democratic Party Always and Swing States after Obama's victory. Hence, previous findings that suggest a decline in total and anti-black hate crime are not related to the police's attitude towards reporting crime after Obama came to power.[50]

[Table 11 here]

[Table 12 here]

[Table 13 here]

7. Conclusion

This paper studies whether the Obama Effect could have played a role in influencing hate crimes after the 2008 presidential election. The hypothesis developed in this paper suggests that total and anti-black hate crimes could decline relatively more in Blue States (or Democratic Party Always States) than in Red States (or Republican Party Always States) after Obama's win. Consistent with the hypothesis, the empirical findings suggest that the

[50] Since the violent and property crimes are yearly basis data, I define the post variable as the year after 2009.

decline of total and anti-black hate crime is mainly in the Blue States, particularly in the Democratic Party Always States, after Obama's success. Thus, the findings suggest that Obama's win could have played an important role in affecting hate crimes in the US.

The findings also have implications in terms of race relations and hate crime, since black people are usually considered to have lower educational attainments and income relative to white people in the US. Obama to be the American's first black president can be headed as a "post-racial" era in the US. His achievement might make people, particularly white people, rethink the race relations and change their racial attitudes towards black people. Consequently, the total and anti-black hate crimes change in the "post-racial" era. As for future research, it will be interesting to see whether the Obama Effect still persists even after the Trump presidency.

Figure 1 Total Hate Crime Rate from 2000 to 2012[51]

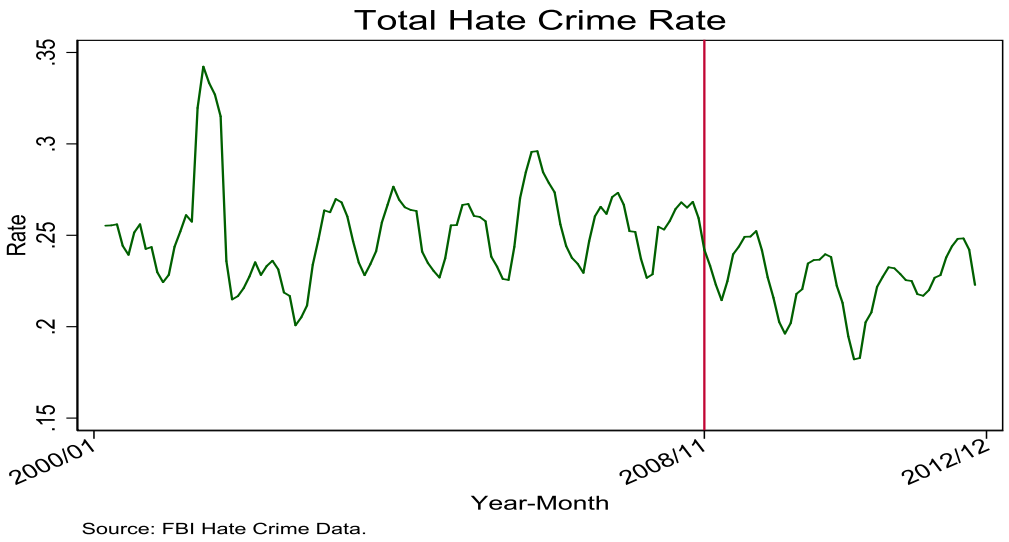
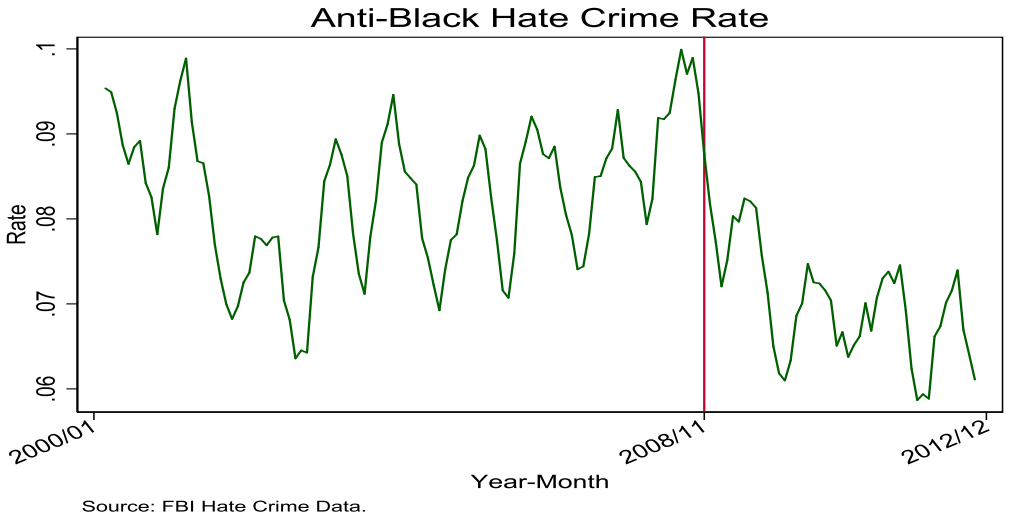


Figure 2 Anti-Black Hate Crime Rate from 2000 to 2012



[51] Note that the hate crime rate in the figures across the paper is 5-month moving average of hate crime. As there exists lots of noise in the raw hate crime data, it might be difficult to show the hate crime pattern. Thus, the smooth moving average hate crime plot may provide the readers more information regarding the hate crime pattern.

Figure 3 Anti-White Hate Crime Rate from 2000 to 2012

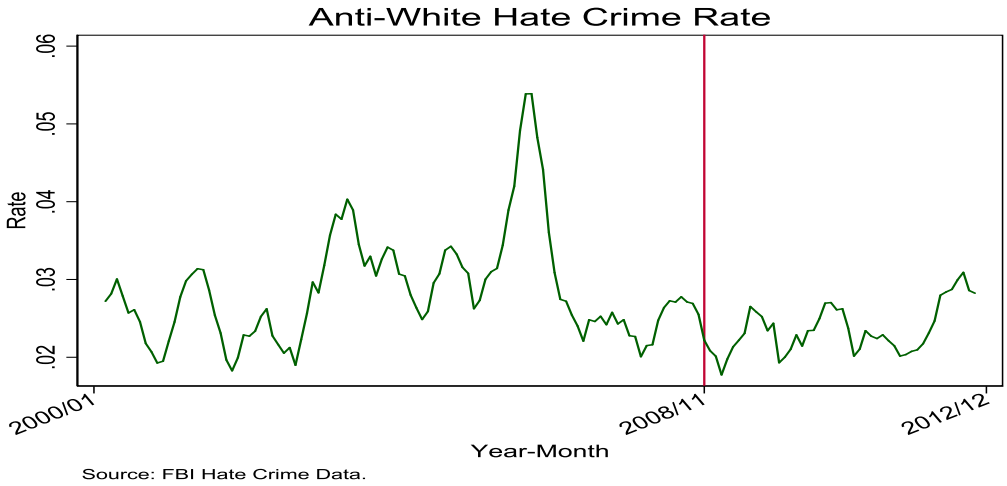
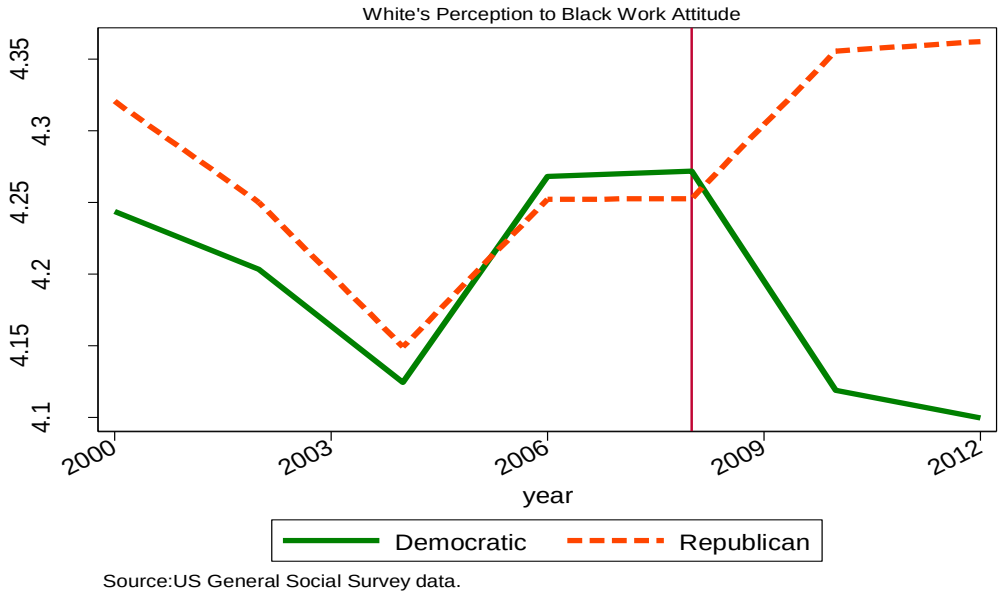
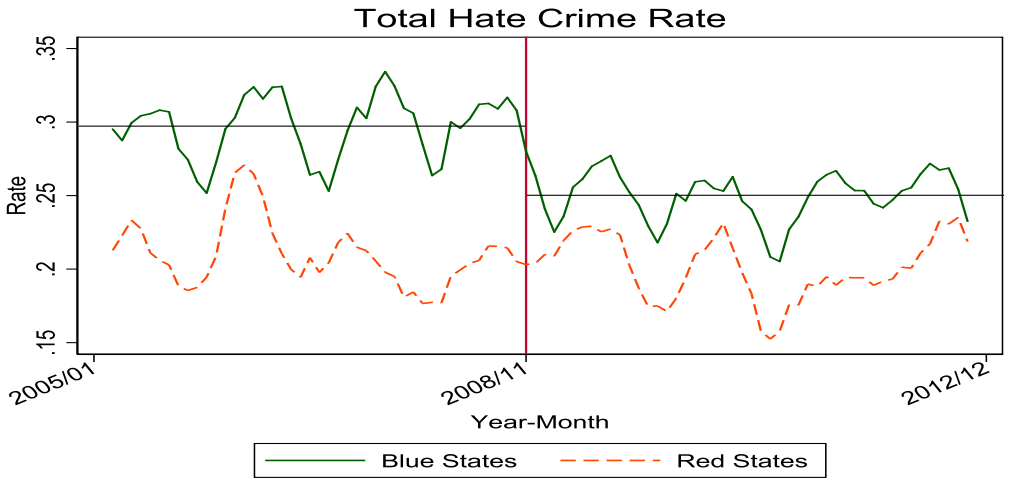


Figure 4 White Peoples' Perception about Black Peoples' Work Attitude from 2000 to 2012[52]



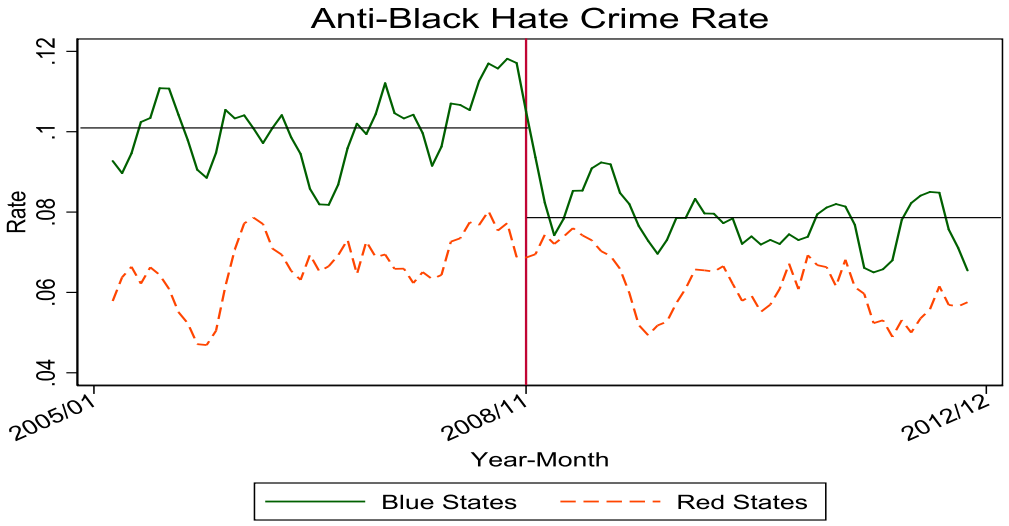
[52] The higher index means that white people perceive black people to be lazier.

Figure 5 Total Hate Crime Rate from 2005 to 2012 by Political Group[53]



Source: FBI Hate Crime Data.

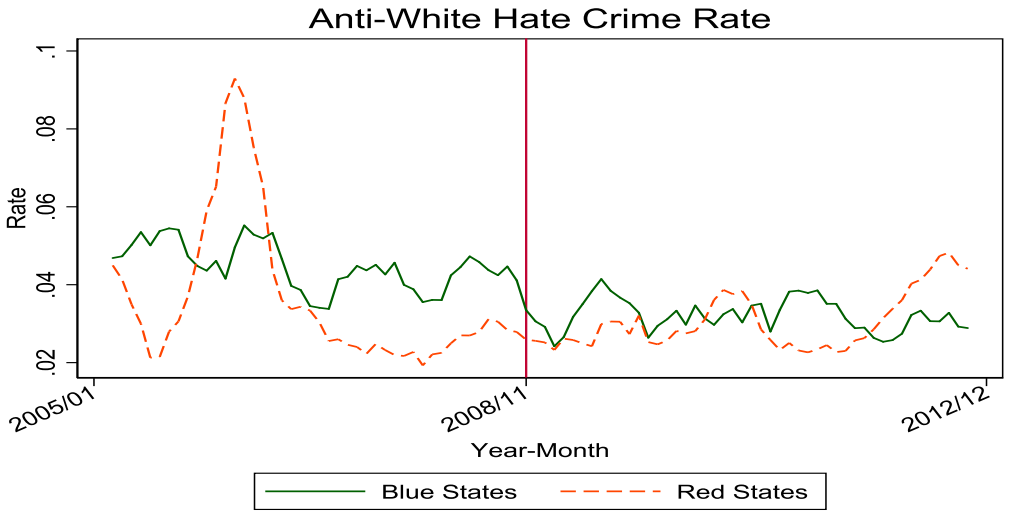
Figure 6 Anti-Black Hate Crime Rate from 2005 to 2012 by Political Group



Source: FBI Hate Crime Data.

[53] The horizontal line in Figure 5 and 6 measures the average of hate crime of the Blue States before and after Obama's victory.

Figure 7 Anti-White Hate Crime Rate from 2005 to 2012 by Political Group



Source: FBI Hate Crime Data.

Table 1 Descriptive Statistics for Hate Crimes per 100,000 persons

Period: 2005/1-2008/10			
	Blue States	Red States	Difference
Total	0.288	0.209	0.078***
Anti-Black	0.097	0.066	0.031***
Anti-White	0.026	0.036	-0.010**
Period: 2008/11-2012/12			
	Blue States	Red States	Difference
Total	0.240	0.200	0.040***
Anti-Black	0.075	0.061	0.014***
Anti-White	0.019	0.030	-0.011***

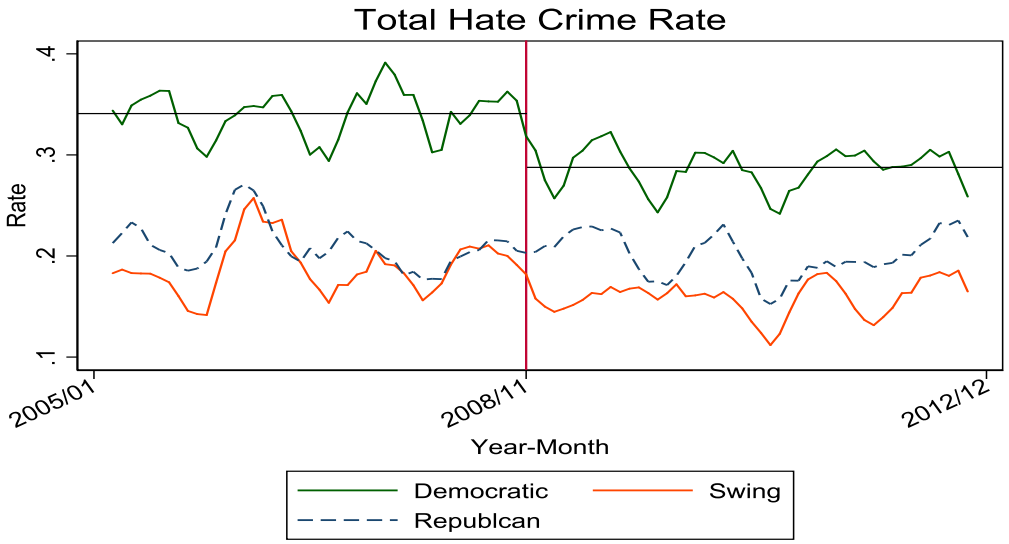
Note: Data Source: Uniform Crime Report (UCR) program of FBI. *** indicates 1% significance level, ** indicates 5 % significance level and * indicates 10 % significance level. Mean test with unequal variance.

Table 2 Descriptive Statistics of Other Variables

	Period: 2005-2012		
	Blue States	Red States	Difference
GDP per capita (thousands)	53.543	43.299	10.242***
Black ratio (%)	11.653	11.544	0.109
Male ratio (%)	49.061	49.629	-0.568***
Population density (per square mile)	639.189	63.639	575.550***
B-W ratio of education	0.908	0.934	- 0.026***
Police (per 1,000 population)	3.474	3.472	0.002

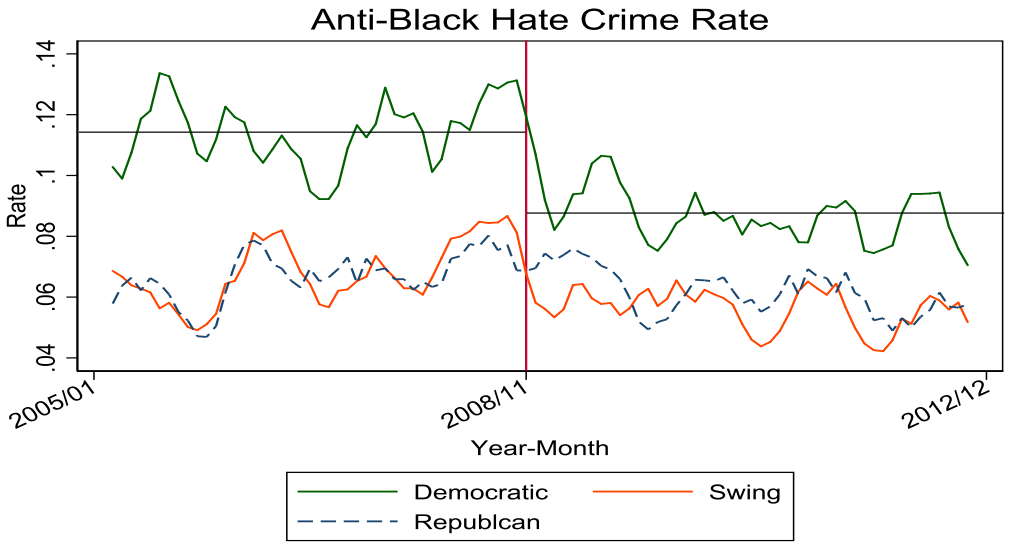
Note: Data Source: Author's collection. *** indicates 1% significance level, ** indicates 5 % significance level and * indicates 10 % significance level. Mean test with unequal variance.

Figure 8 Total Hate Crime Rate from 2005 to 2012 by Political Sub-Group[54]



Source: FBI Hate Crime Data.

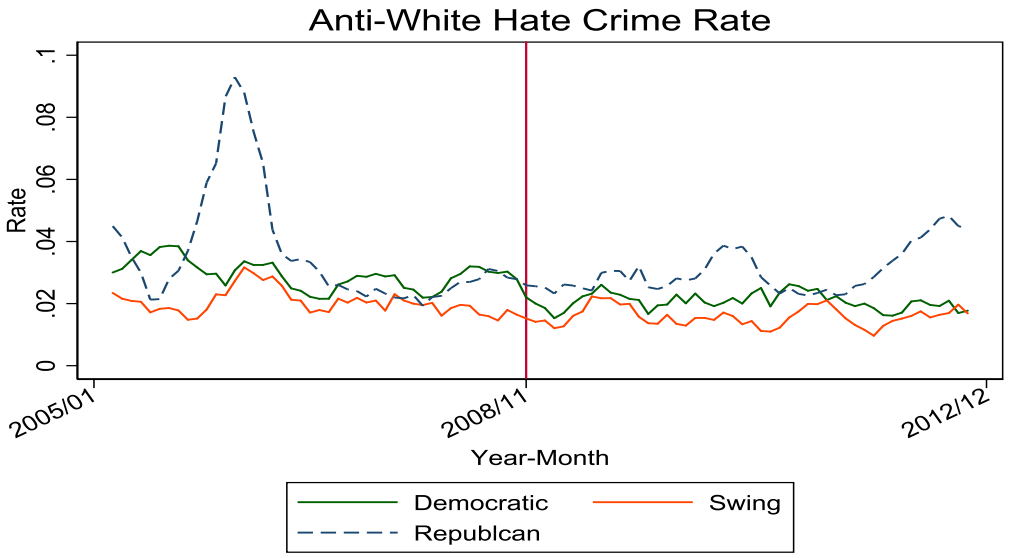
Figure 9 Anti-Black Hate Crime Rate from 2005 to 2012 by Political Sub-Group



Source: FBI Hate Crime Data.

[54] The horizontal line in Figure 8 and 9 measures the average of hate crime of the Democratic Party Always States before and after Obama's victory.

Figure 10 Anti-White Hate Crime Rate from 2005 to 2012 by Political Sub-Group



Source: FBI Hate Crime Data.

Table 3 Descriptive Statistics for Hate Crimes per 100,000 persons

Period: 2005/1-2008/10			
	Democratic	Swing	Republican
Total	0.339	0.177	0.209
Anti-Black	0.113	0.063	0.066
Anti-White	0.029	0.020	0.036
Period: 2008/11-2012/12			
	Democratic	Swing	Republican
Total	0.285	0.146	0.200
Anti-Black	0.087	0.051	0.061
Anti-White	0.021	0.015	0.030

Data Source: FBI Uniform Crime Report (UCR).

Table 4 Descriptive Statistics for Other Variables

	Period: 2005-2012		
	Democratic	Swing	Republican
GDP per capita (thousands)	57.267	45.683	43.299
Black ratio (%)	12.044	10.831	11.544
Male ratio (%)	48.852	49.505	49.629
Population density (per square mile)	871.550	148.651	63.639
B-W ratio of education	0.905	0.913	0.934
Police (per 1,000 population)	3.560	3.294	3.472

Data Source: Author's collection.

Table 5 DID Estimation of Hate Crime Rate between Blue and Red States (No Fixed Effects)

	log(1+hate crime rate)					
	Total	Anti-Black	Anti-White	Total	Anti-Black	Anti-White
Post	-0.005	-0.005	-0.003	-0.001	-0.004	-0.003
	(0.015)	(0.006)	(0.006)	(0.014)	(0.006)	(0.006)
Blue States	0.059*	0.028**	-0.007	0.016	0.019	-0.010
	(0.031)	(0.012)	(0.009)	(0.036)	(0.016)	(0.010)
Post X Blue States	-0.031	-0.014*	-0.004	-0.030	-0.013	-0.004
	(0.019)	(0.008)	(0.007)	(0.019)	(0.009)	(0.007)
GDP per capita				0.003	0.001	-0.000
				(0.002)	(0.001)	(0.000)
Black ratio				-0.005***	-0.001	-0.000
				(0.002)	(0.001)	(0.000)
Male ratio				-0.010	-0.009	0.002
				(0.013)	(0.006)	(0.003)
Population density				0.000	-0.000	0.000*
				(0.000)	(0.000)	(0.000)
B-W ratio of education				-0.040	0.029	-0.016
				(0.116)	(0.046)	(0.027)
Police				0.003	-0.000	-0.006*
				(0.020)	(0.010)	(0.003)
R-squared	0.030	0.031	0.012	0.240	0.047	0.031
State Effect	NO	NO	NO	NO	NO	NO
Year-Month Effect	NO	NO	NO	NO	NO	NO
Observations	4,241	4,241	4,241	4,241	4,241	4,241

Note: Robust standard errors clustered at state level in parentheses. *** indicates 1% significance level, ** indicates 5 % significance level and * indicates 10 % significance level. Sample period covers 2005 to 2012.

Table 6 DID Estimation of Hate Crime Rate (Democratic and Swing vs Republican, No Fixed Effects)

	log(1+hate crime rate)					
	Total	Anti-Black	Anti-White	Total	Anti-Black	Anti-White
Post	-0.005	-0.005	-0.003	-0.002	-0.004	-0.003
	(0.015)	(0.006)	(0.006)	(0.014)	(0.006)	(0.006)
Democratic always States	0.097***	0.041***	-0.005	0.065	0.041*	-0.006
	(0.035)	(0.015)	(0.011)	(0.048)	(0.022)	(0.014)
Swing States	-0.023	-0.002	-0.013	-0.028	-0.002	-0.014
	(0.033)	(0.012)	(0.009)	(0.033)	(0.012)	(0.009)
Post X Democratic always States	-0.036	-0.018*	-0.005	-0.041*	-0.018*	-0.005
	(0.022)	(0.010)	(0.008)	(0.022)	(0.010)	(0.008)
Post X Swing States	-0.019	-0.006	-0.002	-0.015	-0.006	-0.002
	(0.023)	(0.008)	(0.008)	(0.022)	(0.008)	(0.008)
GDP per capita				0.001	0.000	-0.000
				(0.002)	(0.001)	(0.001)
Black ratio				-0.004**	-0.000	-0.000
				(0.002)	(0.001)	(0.000)
Male ratio				0.011	0.001	0.004
				(0.017)	(0.008)	(0.004)
Population density				0.000	-0.000	0.000*
				(0.000)	(0.000)	(0.000)
B-W ratio of education				-0.033	0.032	-0.015
				(0.111)	(0.042)	(0.027)
Police				0.009	0.003	-0.006*
				(0.021)	(0.010)	(0.003)
R-squared	0.106	0.068	0.015	0.270	0.074	0.032
State Effect	NO	NO	NO	NO	NO	NO
Year-Month Effect	NO	NO	NO	NO	NO	NO
Observations	4,241	4,241	4,241	4,241	4,241	4,241

Note: Robust standard errors clustered at state level in parentheses. *** indicates 1% significance level, ** indicates 5 % significance level and * indicates 10 % significance level. Sample period covers 2005 to 2012.

Table 7 DID Estimation of Hate Crime Rate between Blue and Red States

	log(1+hate crime rate)					
	Total	Anti-Black	Anti-White	Total	Anti-Black	Anti-White
Post X Blue States	-0.033*	-0.016*	-0.004	-0.037*	-0.017**	-0.004
	(0.020)	(0.008)	(0.008)	(0.019)	(0.008)	(0.008)
GDP per capita				0.002	0.001	0.001
				(0.003)	(0.001)	(0.001)
Black ratio				0.018	0.005	0.008
				(0.020)	(0.009)	(0.007)
Male ratio				0.016	0.010	0.003
				(0.014)	(0.007)	(0.006)
Population density				0.000**	0.000*	0.000
				(0.000)	(0.000)	(0.000)
B-W ratio of education				-0.007	0.031	0.001
				(0.053)	(0.022)	(0.033)
Police				0.003	0.003	-0.001
				(0.006)	(0.003)	(0.002)
R-squared	0.576	0.353	0.218	0.584	0.360	0.222
State Effect	YES	YES	YES	YES	YES	YES
Year-Month Effect	YES	YES	YES	YES	YES	YES
Observations	4,241	4,241	4,241	4,241	4,241	4,241

Note: Robust standard errors clustered at state level in parentheses. *** indicates 1% significance level, ** indicates 5 % significance level and * indicates 10 % significance level. Sample period covers from 2005 to 2012.

Table 8 DID Estimation of Hate Crime Rate (Democratic and Swing vs Republican)

	log(1+hate crime rate)					
	Total	Anti-Black	Anti-White	Total	Anti-Black	Anti-White
Post X Democratic always States	-0.038*	-0.019*	-0.005	-0.047**	-0.023**	-0.006
	(0.022)	(0.010)	(0.009)	(0.021)	(0.009)	(0.008)
Post X Swing States	-0.023	-0.009	-0.002	-0.014	-0.004	0.001
	(0.024)	(0.009)	(0.008)	(0.025)	(0.010)	(0.009)
GDP per capita				0.003	0.001	0.001
				(0.003)	(0.001)	(0.001)
Black ratio				0.018	0.005	0.008
				(0.019)	(0.009)	(0.008)
Male ratio				0.019	0.012*	0.004
				(0.014)	(0.007)	(0.005)
Population density				0.000**	0.000**	0.000
				(0.000)	(0.000)	(0.000)
B-W ratio of education				-0.004	0.032	0.002
				(0.054)	(0.023)	(0.033)
Police				0.003	0.003	-0.001
				(0.006)	(0.003)	(0.002)
R-squared	0.576	0.353	0.218	0.586	0.363	0.223
State Effect	YES	YES	YES	YES	YES	YES
Year-Month Effect	YES	YES	YES	YES	YES	YES
Observations	4,241	4,241	4,241	4,241	4,241	4,241

Note: Robust standard errors clustered at state level in parentheses. *** indicates 1% significance level, ** indicates 5 % significance level and * indicates 10 % significance level. Periods cover 2005 to 2012.

Table 9 DDD Estimation of Hate Crime Rate for Heterogeneous Analysis

	log (1+ hate crime rate)					
	Total	Anti-Black	Anti-White	Total	Anti-Black	Anti-White
(A) B-W Edu ratio						
Post X Democratic X Edu	-0.577**	-0.249**	-0.130*	-0.449**	-0.192*	-0.112
	(0.218)	(0.117)	(0.068)	(0.170)	(0.098)	(0.068)
Post X Swing X Edu	-0.196	0.021	-0.109	-0.139	0.045	-0.084
	(0.265)	(0.104)	(0.081)	(0.247)	(0.109)	(0.081)
(B) Black ratio						
Post X Democratic X Black ratio	-0.000	-0.001	0.000	-0.001	-0.001	-0.000
	(0.002)	(0.001)	(0.000)	(0.002)	(0.001)	(0.000)
Post X Swing X Black ratio	-0.002	0.000	-0.001	-0.002	0.000	-0.001
	(0.003)	(0.001)	(0.001)	(0.003)	(0.001)	(0.001)
(C) Police						
Post X Democratic X Police	0.031	0.008	0.005	0.010	-0.005	0.004
	(0.019)	(0.009)	(0.006)	(0.023)	(0.010)	(0.006)
Post X Swing X Police	0.029	0.014	0.007	0.035	0.017	0.010
	(0.034)	(0.013)	(0.010)	(0.033)	(0.014)	(0.010)
(D) GDP per capita						
Post X Democratic X GDP	0.002	0.001	-0.001	0.002	0.001	-0.000
	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Post X Swing X GDP	-0.006	-0.002	-0.002	-0.005	-0.002	-0.002
	(0.005)	(0.002)	(0.002)	(0.005)	(0.002)	(0.002)
State Effect	YES	YES	YES	YES	YES	YES
Year-Month Effect	YES	YES	YES	YES	YES	YES
Other Controls	NO	NO	NO	YES	YES	YES
Observations	4,241	4,241	4,241	4,241	4,241	4,241

Note: Robust standard errors clustered at state level in parentheses. *** indicates 1% significance level, ** indicates 5 % significance level and * indicates 10 % significance level. Periods cover 2005 to 2012.

Table 10 DID Estimation of Hate Crime Rate in Period between 1997 and 2004

	log(1+hate crime rate)					
	Total	Anti-Black	Anti-White	Total	Anti-Black	Anti-White
Post X Democratic always States	-0.015	-0.009	-0.004	-0.014	-0.005	-0.002
	(0.016)	(0.008)	(0.005)	(0.013)	(0.007)	(0.004)
Post X Swing States	0.018	0.008	0.004	0.025	0.011	0.009
	(0.020)	(0.010)	(0.007)	(0.016)	(0.008)	(0.007)
GDP per capita				0.008***	-0.000	0.000
				(0.002)	(0.001)	(0.001)
Black ratio				-0.033**	-0.010*	-0.010*
				(0.013)	(0.005)	(0.005)
Male ratio				0.017*	0.011**	0.009***
				(0.010)	(0.005)	(0.002)
Population density				-0.000*	-0.000	-0.000
				(0.000)	(0.000)	(0.000)
B-W ratio of education				0.084	0.033	0.005
				(0.053)	(0.025)	(0.018)
Police				0.002	-0.005	-0.004
				(0.011)	(0.006)	(0.003)
R-squared	0.598	0.412	0.257	0.619	0.412	0.279
State Effect	YES	YES	YES	YES	YES	YES
Year-Month Effect	YES	YES	YES	YES	YES	YES
Observations	4,026	4,026	4,026	3,523	3,523	3,523

Note: Robust standard errors clustered at state level in parentheses. *** indicates 1% significance level, ** indicates 5 % significance level and * indicates 10 % significance level. The sample periods used in the regression without controls cover 1997 to 2004. The sample periods used in the regression with controls cover 1998 to 2004 since there is no data for police employees in 1997. In addition, there is no data for education in Idaho in 1998, Massachusetts in 2001, North Dakota in 1998 and Vermont in 2000.

Table 11 DID Estimation of Violent and Property Crime Rate

	log(crime rate)			
	Violent	Property	Violent	Property
Post X Democratic always States	0.015	0.031	0.026	0.027
	(0.040)	(0.025)	(0.035)	(0.026)
Post X Swing States	-0.059	-0.042	-0.022	-0.031
	(0.044)	(0.031)	(0.036)	(0.026)
GDP per capita			0.014***	0.003
			(0.005)	(0.003)
Black ratio			0.037	-0.011
			(0.029)	(0.023)
Male ratio			-0.006	0.016
			(0.018)	(0.017)
Population density			0.000	0.000
			(0.000)	(0.000)
B-W ratio of education			-0.042	0.046
			(0.162)	(0.083)
Police			0.007	-0.004
			(0.022)	(0.011)
R-squared	0.973	0.952	0.976	0.954
State Effect	YES	YES	YES	YES
Year-Month Effect	YES	YES	YES	YES
Observations	400	400	400	400

Note: Robust standard errors clustered at state level in parentheses. *** indicates 1% significance level, ** indicates 5 % significance level and * indicates 10 % significance level. Since this exercise considers yearly data, I define the post variable as the year after 2009.

Table 12 DID Estimation of Different Type of Violent Crime Rate

	log(crime rate)			
	Murder	Rape	Robbery	Aggravated Assault
Post X Democratic always States	0.045	0.003	0.046	0.025
	(0.042)	(0.033)	(0.038)	(0.042)
Post X Swing States	-0.025	-0.045	-0.054	-0.001
	(0.032)	(0.031)	(0.038)	(0.045)
GDP per capita	0.013	0.011***	0.019***	0.014**
	(0.010)	(0.003)	(0.006)	(0.006)
Black ratio	0.019	0.035	0.031	0.057
	(0.049)	(0.028)	(0.035)	(0.037)
Male ratio	-0.009	0.042*	0.000	-0.015
	(0.042)	(0.023)	(0.029)	(0.023)
Population density	-0.001**	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
B-W ratio of education	-0.214	0.040	0.013	-0.069
	(0.198)	(0.150)	(0.116)	(0.193)
Police	-0.019	0.019	-0.009	0.012
	(0.019)	(0.021)	(0.019)	(0.025)
R-squared	0.944	0.942	0.990	0.968
State Effect	YES	YES	YES	YES
Year-Month Effect	YES	YES	YES	YES
Observations	400	400	400	400

Note: Robust standard errors clustered at state level in parentheses. *** indicates 1% significance level, ** indicates 5 % significance level and * indicates 10 % significance level. Since this exercise considers yearly data, I define the post variable as the year after 2009.

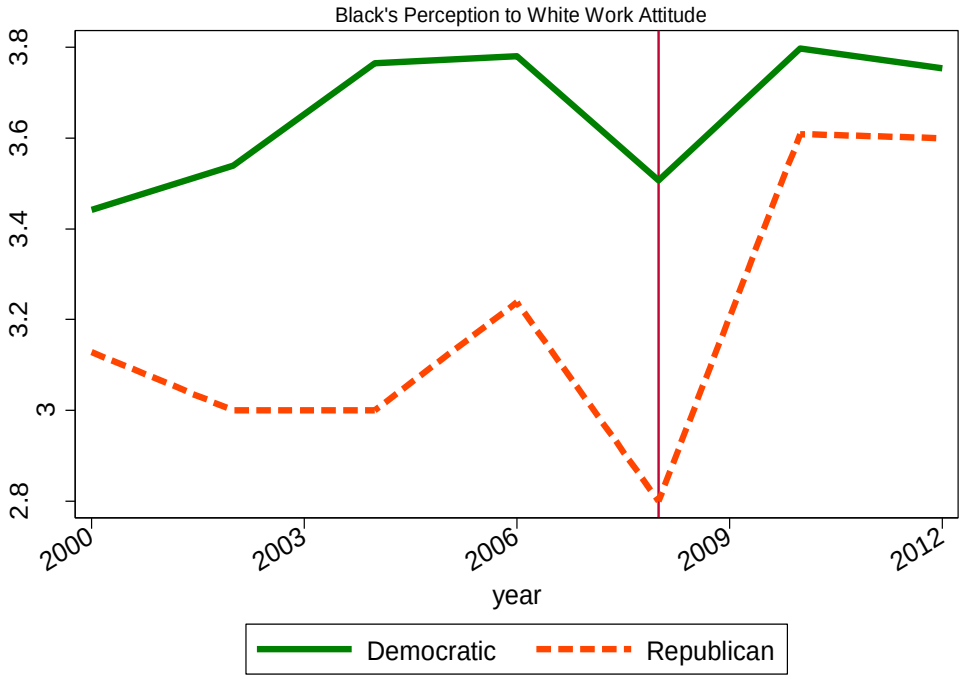
Table 13 DID Estimation of Different Type of Property Crime Rate

	log(crime rate)		
	Burglary	Larceny Theft	Motor Vehicle Theft
Post X Democratic always States	0.045	0.035	-0.032
	(0.031)	(0.023)	(0.046)
Post X Swing States	-0.028	-0.018	-0.087*
	(0.037)	(0.021)	(0.051)
GDP per capita	-0.003	0.002	0.019***
	(0.004)	(0.002)	(0.006)
Black ratio	-0.011	-0.011	-0.045
	(0.027)	(0.026)	(0.036)
Male ratio	0.023	0.020	0.016
	(0.023)	(0.013)	(0.045)
Population density	-0.000	0.000*	-0.001***
	(0.000)	(0.000)	(0.000)
B-W ratio of education	-0.006	0.039	0.041
	(0.097)	(0.077)	(0.138)
Police	-0.015	0.002	-0.015
	(0.013)	(0.010)	(0.021)
R-squared	0.967	0.948	0.972
State Effect	YES	YES	YES
Year-Month Effect	YES	YES	YES
Observations	400	400	400

Note: Robust standard errors clustered at state level in parentheses. *** indicates 1% significance level, ** indicates 5 % significance level and * indicates 10 % significance level. Since this exercise considers yearly data, I define the post variable as the year after 2009.

Appendix

Figure A1 Black Peoples' Perceptions about White Peoples' Work Attitudes from 2000 to 2012



Source:US General Social Survey data.

Figure A2 Average Number of Republican Politician Affiliated with TMP by Political Group [55]

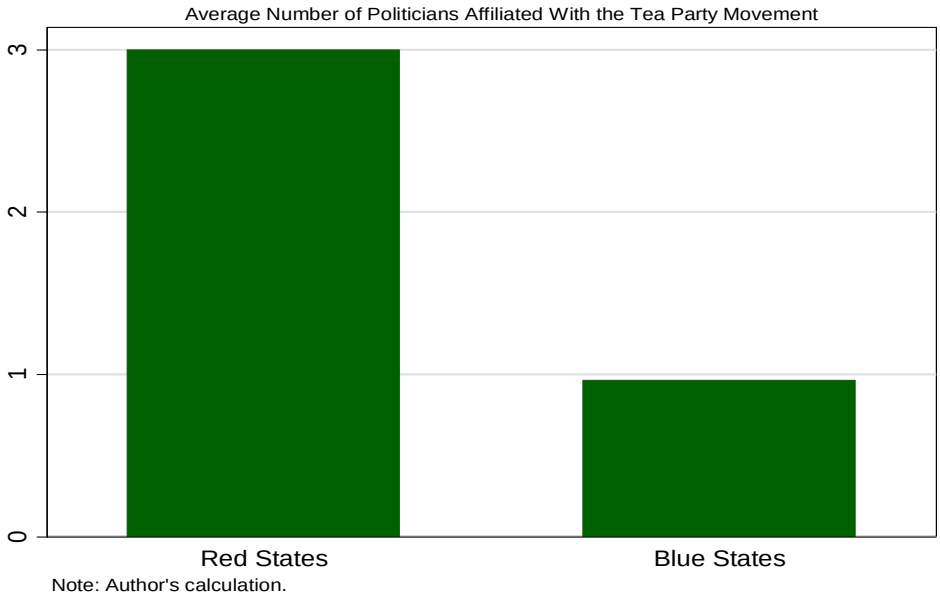
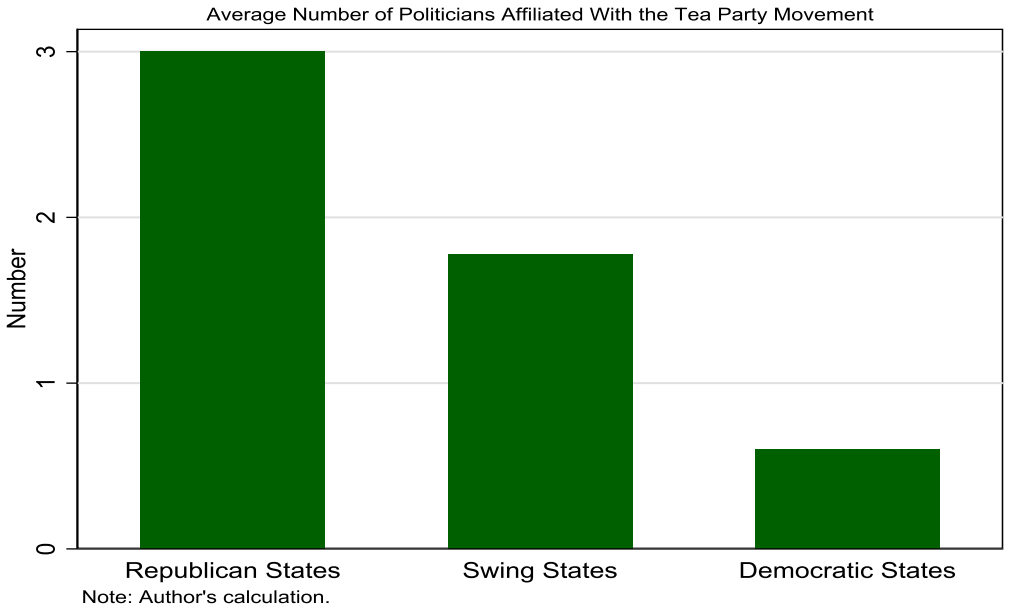


Figure A3 Average Number of Republican Politicians Affiliated with TMP by Political Sub-Group



[55] The list of politicians affiliated with the TPM can be found on Wikipedia: https://en.wikipedia.org/wiki/List_of_politicians_affiliated_with_the_Tea_Party_movement.

Table A1 DID Estimation of Hate Crime Rate (Blue vs Red, With Trend)

	log(1+hate crime rate)					
	Total		Anti-Black		Anti-White	
Post X Blue States	-0.037*	-0.037*	-0.017**	-0.014	-0.004	-0.002
	(0.019)	(0.022)	(0.008)	(0.011)	(0.008)	(0.007)
GDP per capita	0.002	0.002	0.001	0.001	0.001	0.001
	(0.003)	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)
Black ratio	0.018	0.018	0.005	0.005	0.008	0.008
	(0.020)	(0.020)	(0.009)	(0.009)	(0.007)	(0.007)
Male ratio	0.016	0.016	0.010	0.010	0.003	0.003
	(0.014)	(0.014)	(0.007)	(0.007)	(0.006)	(0.006)
Population density	0.000**	0.000**	0.000*	0.000*	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
B-W ratio of education	-0.007	-0.007	0.031	0.031	0.001	0.001
	(0.053)	(0.054)	(0.022)	(0.022)	(0.033)	(0.033)
Police	0.003	0.003	0.003	0.003	-0.001	-0.001
	(0.006)	(0.006)	(0.003)	(0.003)	(0.002)	(0.002)
R-squared	0.584	0.584	0.360	0.360	0.222	0.222
State Effect	YES	YES	YES	YES	YES	YES
Year-Month Effect	YES	YES	YES	YES	YES	YES
Group Trend	NO	YES	NO	YES	NO	YES
Observations	4,241	4,241	4,241	4,241	4,241	4,241

Note: Robust standard errors clustered at state level in parentheses. *** indicates 1% significance level, ** indicates 5 % significance level and * indicates 10 % significance level. Sample period covers from 2005 to 2012.

Table A2 DID Estimation By Using Hate Crime Rate

	hate crime rate		
	Total	Anti-Black	Anti-White
Post X Blue States	-0.048*	-0.020**	-0.002
	(0.025)	(0.009)	(0.009)
GDP per capita	0.003	0.001	0.001
	(0.004)	(0.001)	(0.002)
Black ratio	0.025	0.004	0.007
	(0.028)	(0.011)	(0.009)
Male ratio	0.023	0.013	0.005
	(0.019)	(0.008)	(0.007)
Population density	0.001***	0.000	0.000
	(0.000)	(0.000)	(0.000)
B-W ratio of education	-0.004	0.030	0.007
	(0.074)	(0.027)	(0.041)
Police	0.003	0.004	-0.001
	(0.009)	(0.004)	(0.003)
R-squared	0.549	0.345	0.184
Year-Month Effect	YES	YES	YES
State Effect	YES	YES	YES
Observations	4,241	4,241	4,241

Note: Robust standard errors clustered at state level in parentheses. *** indicates 1% significance level, ** indicates 5 % significance level and * indicates 10 % significance level. Sample period covers from 2005 to 2012.

Table A3 DID Estimation By Using Continuous Voting Ratio (Hate Crime Rate Case)

	hate crime rate		
	Total	Anti-Black	Anti-White
Post X Dem2008	-0.254*	-0.117**	-0.015
	(0.128)	(0.049)	(0.038)
GDP per capita	0.004	0.001	0.001
	(0.004)	(0.001)	(0.002)
Black ratio	0.021	0.002	0.007
	(0.026)	(0.011)	(0.009)
Male ratio	0.028	0.015*	0.005
	(0.019)	(0.008)	(0.007)
Population density	0.001***	0.000**	0.000
	(0.000)	(0.000)	(0.000)
B-W ratio of education	-0.010	0.027	0.007
	(0.073)	(0.026)	(0.042)
Police	0.002	0.004	-0.001
	(0.009)	(0.004)	(0.003)
R-squared	0.549	0.345	0.184
Year-Month Effect	YES	YES	YES
State Effect	YES	YES	YES
Observations	4,241	4,241	4,241

Note: Robust standard errors clustered at state level in parentheses. *** indicates 1% significance level, ** indicates 5 % significance level and * indicates 10 % significance level. Sample period covers from 2005 to 2012.

Table A4 DID Estimation By Using Continuous Voting Ratio (Log Hate Crime Rate Case)

	log(1+hate crime rate)		
	Total	Anti-Black	Anti-White
Post X Dem2008	-0.190*	-0.101**	-0.019
	(0.098)	(0.042)	(0.034)
GDP per capita	0.003	0.001	0.001
	(0.003)	(0.001)	(0.001)
Black ratio	0.015	0.004	0.008
	(0.018)	(0.009)	(0.007)
Male ratio	0.019	0.012*	0.003
	(0.014)	(0.007)	(0.005)
Population density	0.000***	0.000***	0.000
	(0.000)	(0.000)	(0.000)
B-W ratio of education	-0.012	0.029	0.000
	(0.053)	(0.022)	(0.033)
Police	0.002	0.003	-0.001
	(0.006)	(0.003)	(0.002)
R-squared	0.584	0.361	0.222
Year-Month Effect	YES	YES	YES
State Effect	YES	YES	YES
Observations	4,241	4,241	4,241

Note: Robust standard errors clustered at state level in parentheses. *** indicates 1% significance level, ** indicates 5 % significance level and * indicates 10 % significance level. Sample period covers from 2005 to 2012.

Table A5 DID Estimation of Hate Crime Rate (Dem and Swing vs Rep, With Trend)

	log(1+hate crime rate)					
	Total		Anti-Black		Anti-White	
Post X Democratic always States	-0.047**	-0.042*	-0.023**	-0.017	-0.006	-0.003
	(0.021)	(0.023)	(0.009)	(0.012)	(0.008)	(0.008)
Post X Swing States	-0.014	-0.027	-0.004	-0.008	0.001	0.002
	(0.025)	(0.026)	(0.010)	(0.011)	(0.009)	(0.007)
GDP per capita	0.003	0.003	0.001	0.001	0.001	0.001
	(0.003)	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)
Black ratio	0.018	0.018	0.005	0.005	0.008	0.008
	(0.019)	(0.019)	(0.009)	(0.009)	(0.008)	(0.007)
Male ratio	0.019	0.020	0.012*	0.013*	0.004	0.004
	(0.014)	(0.014)	(0.007)	(0.006)	(0.005)	(0.005)
Population density	0.000**	0.000**	0.000**	0.000**	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
B-W ratio of education	-0.004	-0.004	0.032	0.032	0.002	0.002
	(0.054)	(0.054)	(0.023)	(0.022)	(0.033)	(0.034)
Police	0.003	0.003	0.003	0.003	-0.001	-0.001
	(0.006)	(0.006)	(0.003)	(0.003)	(0.002)	(0.002)
R-squared	0.586	0.586	0.363	0.363	0.223	0.223
State Effect	YES	YES	YES	YES	YES	YES
Year-Month Effect	YES	YES	YES	YES	YES	YES
Group Trend	NO	YES	NO	YES	NO	YES
Observations	4,241	4,241	4,241	4,241	4,241	4,241

Note: Robust standard errors clustered at state level in parentheses. *** indicates 1% significance level, ** indicates 5 % significance level and * indicates 10 % significance level. Sample period covers from 2005 to 2012.

Table A6 DID Estimation By Using Hate Crime Rate (Dem and Swing vs Rep)

	hate crime rate		
	Total	Anti-Black	Anti-White
Post X Democratic always States	-0.063**	-0.027**	-0.004
	(0.028)	(0.011)	(0.010)
Post X Swing States	-0.013	-0.003	0.004
	(0.032)	(0.011)	(0.010)
GDP per capita	0.004	0.002	0.001
	(0.004)	(0.001)	(0.002)
Black ratio	0.026	0.004	0.008
	(0.027)	(0.011)	(0.009)
Male ratio	0.028	0.015*	0.005
	(0.018)	(0.008)	(0.007)
Population density	0.001***	0.000*	0.000
	(0.000)	(0.000)	(0.000)
B-W ratio of education	0.001	0.032	0.008
	(0.075)	(0.027)	(0.041)
Police	0.003	0.004	-0.001
	(0.009)	(0.004)	(0.003)
R-squared	0.551	0.347	0.185
Year-Month Effect	YES	YES	YES
State Effect	YES	YES	YES
Observations	4,241	4,241	4,241

Note: Robust standard errors clustered at state level in parentheses. *** indicates 1% significance level, ** indicates 5 % significance level and * indicates 10 % significance level. Sample period covers from 2005 to 2012.

Chapter 3 The Long-Run Labor Market Consequences of Being Born in A Bad Economy[56]

1. Introduction

A number of studies have documented that either an economic or environmental shock at an early stage of life might have a long-term negative impact on individual outcomes.[57] However, one gap among these studies is that they have not addressed how economic shocks, particularly in the year of birth, can affect future outcomes such as earnings in adulthood.[58] An economic shock in year of birth could affect later-life earnings via two possible channels: namely "financial input channel" and "time input channel". Regarding the financial input channel, bad economic conditions are usually associated higher unemployment rates, fewer jobs and a loss of wealth (e.g. Pfeffer et al. (2013)). As a result, parents might not be able to provide their newly born children with enough nutrition and care during economic downturns due to their challenging financial situation. In addition, a range of studies indicate that mothers usually experience poorer general health status during recessions (e.g. Currie et al. (2015)). Olaffson (2016) shows that pregnant women subject to financial stress are likely to have babies with a lower birth weight, which is an important predictor of health in adulthood. Accordingly, children who are born during recessions could therefore be at risk of malnutrition and related disease. This risk would further impede children's early childhood development and their human capital accumulation.[59]

On the other hand, the effect of the time input channel is clear since the opportunity cost of time is lower during recessions. This could lead to parents having more time to care for their babies (Aguiar et al. (2013)). Since spending more time with newborns could help them

[56] In this study, a bad economy can be referred to a recession.
[57] Rao (2016) documents that there exists a negative correlation between the economic conditions experienced in childhood and education and income in later life. Kahn (2010) and Oreopoulos et al. (2012) find that graduating from college in the midst of bad economic conditions can have a long-term negative effect on earnings. In addition, studies (e.g. Almond (2006); Nelson (2010); Lin and Liu (2014)) show that the cohorts *in utero* during the peak of influenza pandemics exhibit lower educational attainment, lower income, reduced socioeconomic status and are also more likely to have a serious health problem.
[58] My study is similar to Rao (2016), who mainly investigates the impact of economic condition in childhood on later-life education and income. However, in contrast to Rao (2016), this paper focuses on the effect of economic conditions in year of birth on the later-life earnings.
[59] In this paper, the definition of human capital is kept generic. Schultz (1961) indicated that there are different kinds of human capital such as education, on-the-job training and health.

to develop their general abilities (e.g. Waldfogel (2006); Fox et al. (2013)), the time input channel could have a positive impact on children's future labour market performance.

These two channels could result in differences in future economic outcomes between those born during economic downturns and those born in booms. If we observe that the earnings of those who were born in recessions are lower than the earnings of those who were born in booms, we could conclude that the negative effect of the financial input channel dominates any positive effect of time input channel. In effect, the initial economic disadvantages experienced by those born in a bad economy would result in a persistent wage scar. Accordingly, this paper attempts to examine whether people who were born in bad economic conditions suffer income losses in the future. In other words: does an economic shock in year of birth affect later-life earnings?

Furthermore, when the financial channel matters in this way, its negative effect might vary across families. Simply put, the negative effects are likely to be more severe for low income families. As a result, in this paper, I would also like to examine whether the effects of economic conditions in the year of birth are heterogeneous across wage quartile groups.

To explore these questions, I utilise the 2000 US Census to study economic outcomes for males born between 1965 and 1979. The Census data allows me to identify an individual's year and the state of birth, which helps us to measure the regional economic conditions that prevailed immediately after the birth. To measure these conditions, I use state unemployment rate, following the example of previous literature (e.g. Rhum (2000); Kahn (2010); Wu and Cheng (2010); Oreopoulos et al. (2012); Currie et al. (2015)). Since the state unemployment rate varies across the year and state of birth, I collapse the individual data at the level of year and state of birth. I then analyse log wage as a function of economic conditions at the state-year level, including other control variables, such as the economic conditions in the year of graduation, educational attainment, occupation, industry, race, and marital status.

In my analysis, I use two empirical strategies: these are "Static" and "Dynamic effect" models. The "Static" model considers the relationship between wage and economic conditions at year of birth. The "Dynamic effect" model takes the economic conditions after year of birth into account to explore if economic conditions after the year of birth also affect individuals' future wage.[60] Empirical results from the "Static" model show a persistent and

[60] As the basic estimate of the effect of the unemployment rate in year of birth exposure might capture the average change in earnings from being born in a recession given the regular evolution of the state unemployment rate faced afterwards, following Oreopoulos et al. (2012), this paper uses "Dynamic effect" model to address this concern.

negative wage effect of higher level of state unemployment rate in the year of birth. The estimate indicates a wage loss of 1% per one unit increase in the unemployment rate. The magnitude of wage loss is similar for those with and without college education. These findings suggest that males who were born in bad economic conditions may have lacked financial support from their parents and thus had difficulties in accumulating their initial human capital. The results of the "Dynamic effect" model confirm that the economic conditions at birth, rather than other factors, have a significant and negative impact on future wages. Regarding the analysis among different wage quartile groups, I observe the impact of economic shock at birth on the low wage groups is greater than the impact on high-wage groups. All the findings described above suggest that a negative economic shock in the early life of individuals, particularly the year of birth, is harmful to those individuals' earnings in adulthood.

There are some challenges that could be applied to the interpretation. For example, fertility decisions might bias our estimation results. People at different family income levels may be more or less likely to have children during a recession. Taylor and Livingston (2011) indicate that fertility rates for the hispanic and black population decline substantially relative to whites in a recession year. Furthermore, policies such as the "Title X Family Planning Program" in 1970 could help low-income families with birth control.[61] Accordingly, one may infer that a family at relatively higher income level could be more likely to have a child during economic downturns. Thus, there may exist a positive selection effect that would bias our results. Since the empirical results show that initial economic conditions are negatively associated with later-life earnings, we may say that the estimates in this study are a lower bound estimate of the impact of recessionary conditions in the year of birth on later individual earnings.

This paper complements the literature which studies the relationship between economic or environmental conditions in early life and later economic outcomes (e.g. Almond (2006); van den Berg et al. (2006); Maccini and Yang (2009); Kahn (2010); Nelson (2010); Oreopoulos et al. (2012); Lin and Liu (2014); Rao (2016)). This paper differs from previous studies in that it mainly focuses on the examination of the long-run impact of an economic shocks at year of birth. This paper confirms that poor economic conditions in childhood, particularly at the year of birth, have a significant negative effect on later-life earnings.

[61] Since the sample used in this paper was born between 1965 and 1979, this policy might play a role in affecting the fertility rate between 1965 and 1979.

The structure of this paper is as follows. Section 2 discusses related literature. Section 3 discusses possible mechanisms. Section 4 describes the data and empirical strategy. Section 5 presents our findings and Section 6 concludes.

2. Related Literature

This paper relates to the literature which discusses the long-run effect of early life shocks such as an economic or environmental shock on people's later-life health or labour market outcomes etc. Regarding the studies about the effect of economic shocks on the later-life outcomes, Kahn (2010) uses the US National Longitudinal Survey of Youth (NLSY) while Oreopoulos et al. (2012) use Canadian university–employer–employee matched data to examine whether people who graduate in recessions would have a lower earnings in the future due to job mismatch concerns. Both papers indicate that there does exist a persistent and negative wage effect of bad economic conditions in the year when people graduate from college. In addition, Rao (2016) examines the influence of the business cycle in childhood on economic outcomes in adulthood. His findings suggest that the average unemployment rate in childhood has a negative effect on the later-life education and income.

As well as studies on the impact of a recession on labour market outcomes, other studies examine the impact of economic conditions on longevity. For example, van den Berg et al. (2006) examine the impact of early-life economic conditions on longevity in the Netherlands. They find that those born during recessions had higher mortality rates later in life than those born during economic booms.

A number of papers have investigated the impact of environmental shocks on later life outcomes. For example, Barker (1992) developed the 'Fetal Origins' hypothesis, which argues that shocks experienced by the fetus during pregnancy impacts later life outcomes. Almond (2006) builds upon this hypothesis and uses US census data to study the effect of the 1918 US influenza pandemic on later educational attainment and income. His findings indicate that people *in utero* in this period have lower educational attainment and lower income than others. Similarly, Nelson (2010) and Lin and Liu (2014) examine this idea using Brazilian and Taiwanese data, respectively. Their findings also indicate that cohorts *in utero* during the 1918 influenza are shorter in height as children, less educated, and more likely to have a serious health problem later in life. Maccini and Yang (2009) investigate the effect of weather shocks around the time of birth on the adult health. By using rainfall data in

Indonesia as a proxy for weather shocks, they find that higher early-life rainfall leads to improved health, schooling levels, and general socioeconomic status for women but not for men. They attribute this to the gender bias in the allocation of nutrition. These studies confirm that an environmental shock at the early stage of individuals' life does indeed play a role in influencing their outcomes in the future.

3. Possible Mechanisms

This section discusses how economic conditions at birth influence an individual's outcomes in adulthood. I will mainly focus on the discussion of two mechanisms which might make people have different later-life economic outcomes: the financial input and time input channels.

3.1 Financial Input Channel

In a recession, households often experience a huge decline in wealth. For instance, Pfeffer et al. (2013) indicate that one-fourth of American families suffered at least a 75 % wealth loss and more than half of all families lost at least 25 % wealth between 2007 and 2011. Due to increased financial restrictions during a recession, parents may have insufficient financial security to support their children, including newborns. Furthermore, recessions might also affect the health of mothers. Currie et al. (2015) indicates that recessions are associated with decreased self-reported health by mothers and increased smoking and drug use. If a mother with poor health gives birth, the health of a newborn could be negatively impacted as well. Olafsson (2016) confirms this by showing that pregnant women under the stress associated with financial crisis are more likely to have lower birth weight babies.[62] Hence, the lack of proper nutrition and lower birth weight would make the newborns be at high risk of ill health. Ill health in childhood is associated with worse human capital outcomes (e.g. Almond

[62] Besides the financial stress mechanism, there also exist other possible channels that can lead the women to have low birth weight babies. Studies such as Torche (2011) and Duncan et al. (2017) also show that exposure to an earthquake or the Super Bowl is associated with an increased the likelihood of low birth weight due to these events would cause the psychological stress of a pregnant women. In addition, Almond and Mazumder (2011) indicates that Arab pregnant women who are exposed to Ramadan are more likely to have babies with lower birth weight as they may have less nutrition during the Ramadan.

(2006); Currie et al. (2010); Almond and Currie (2011b); Lin and Liu (2014)). Thus, the financial input channel causes lower lifetime earnings in newborns.

3.2 Time Input Channel

In contrast to the influence of the financial input channel, a bad economy might be helpful to newborns' human capital accumulation. Since the price of leisure during recessions is relatively cheaper than during booms, parents could spend more time at home during economic downturns. Aguiar et al. (2013) confirm this by showing that households allocated roughly 5% of the foregone market work hours to child care in a recession period between 2008 and 2010. Moreover, studies (e.g. Waldfogel (2006); Fox et al. (2013)) point out that if parents could spend more time with their children, children will have better social and cognitive development. Thus, the time input channel could have a positive effect on the newborns' later-life labour market outcomes.

Since these two possible mechanisms at the year of birth would affect the early development of children simultaneously, the economic outcomes in adulthood would depend on which channel dominates. Accordingly, if the empirical result shows that people who were born in recessions have lower earnings than those who were born during economic booms, we may conclude that the financial input channel dominates the time input channel.

4. Data and Empirical Strategy

4.1 Measure for Bad Economic Conditions

The main variable of interest is economic conditions at the year of birth. As mentioned in the previous section, initial economic conditions could have either a negative effect or positive effect earnings via two channels. Thus, for this study it is important to find a good variable to measure the economic conditions that prevail at the time of birth. By following previous studies (e.g. Rhum (2000); Khan (2010); Wu and Cheng (2010); Oreopoulos et al. (2012); Currie et al. (2015); Rao (2016)), I use the unemployment rate as a proxy for macroeconomic conditions at the year of birth.

In addition to the measure for economic condition in the year of birth, I also use one variable which measures the economic condition when an individual graduated from school. This variable reveals the effect of economic situation at year of graduation on later-life income. Here, I briefly discuss how I construct this variable for each individual. Since the census data do not provide precise information regarding when an individual graduated from the schools, I use individuals' educational level to infer the year of graduation. For example, if an individual educational level is grade 12, I infer that their year of graduation is "year of birth +5 + 12", where "5" is years before schools and "12" is the total years of schoolings. By constructing the information of year of graduation, I can use the unemployment rate at year of graduation in place of birth to measure the economic condition when an individual graduated.

4.2 Data

The data set used for this study is 2000 US Census data and I mainly focus on the male cohorts between 1965 and 1979.[63] The sample born after 1979 is discarded because people born after 1979 had insufficient labour experience in the survey year. In addition, I discard the sample born before 1965 as I do not have enough information on economic conditions when they were born. Since the main independent variable, the unemployment rate, varies across year and region (state) of birth, I collapse the individual data at the level of year and region (state) of birth.[64] The collapsed variables are the real wage, the ratio of educational attainments above university-level, the proportion of white people, the proportion of married people, the proportion of those with management occupation and of those working in manufacturing industry.[65]

Table 1 shows the descriptive statistics of samples. The result from column (1) indicates that real wage of the full sample is about 16,244 dollars in 2000.[66] The proportion with university degrees is about 0.215. Whites form the majority of the population in the full sample. Moreover, the proportion of those who got married is about 0.468. The proportion

[63] Ideally, we can use more cohort samples from the 2010 US Census data to examine the idea. However, the 2010 Census data is not released by the US government so we are not able to use the samples from 2010 Census data set to study the idea.
[64] Oreopoulos et al. (2012) collapse their data for the same reason.
[65] The university variable refers to the people who study in the 4 years or 5+ years of college.
[66] This wage is deflated by the CPI index based on a 1982 base of 100. If this wage is deflated by the CPI index based on a 1999 base of 100, it will be about 27,423 dollars.

of people having management jobs and the proportion of people working in the manufacture industry are about 0.203 and 0.178, respectively.

The results in column (2) and column (3) indicate that people with educational attainments above the college level earn substantial more than those without such attainments. The proportion of those with a university degree in the sample with educational attainments above college is about 0.433. Moreover, the sample with educational attainments above college also has a higher share of people who had management jobs than the sample with educational attainments below college. The share of people working in manufacture industry is lower in those in the higher education group. Both the groups are, however, balanced in terms of the ratio of white people and married people.

[Table 1 here]

4.3 Static Model

To examine the impact of economic condition at year of birth on the later-life income, I use the empirical model below:

$$\log(w_{by}) = \alpha + \gamma_b + \gamma_y + \beta_0 UR_{by} + X_{by}\delta + \varepsilon_{by} \qquad (1)$$

, where b refers to the place of birth and y refers to the year of birth. $\log(w_{by})$ is the log real wage per year of birth in each region of birth in the year 2000. UR_{by} is the unemployment rate at the time of birth in each birth region. The vector X_{by} represents the characteristics measured at each cohort in each region in the year 2000. These characteristics variables include not only the variables discussed in the data section but also a measure of the unemployment rate dated at the time that an individual graduated. Taking this unemployment rate into account can help us to compare the magnitude of its impact on the college graduate earnings with the findings in the previous literature.[67] The coefficients γ_b and γ_r are place and year of birth fixed effects, respectively. The year dummy variable can capture the differentials between different years of birth and the region dummy variable can

[67] As mentioned before, this variable is constructed by using the information of individual educational level. Therefore, there might exist measure errors, which could bias the estimate of impact of economic condition at year of graduation on the individuals' earnings, in this variable.

capture the differentials between different regions of birth. Furthermore, the region dummy variable can also help us to control for the time-invariant unobserved characteristics. The coefficient of main interest, β_0, which measures the impact of the economic situation at birth on the earnings, will help us to understand which mechanism plays the most significant role in affecting the later-life income.

4.4 Dynamic Effect Model

The model discussed above is a "Static" model since it does not consider the effects of economic conditions in other years. It is well recognised that child mental development proceeds rapidly during the first five years of life. Low incomes or a lack of health insurance in the first five years may also play a role in a child's later-life outcomes (e.g. Almond and Currie (2011b)). Hence, in order to know the effect of early life economic conditions, I add the state unemployment rate in the first five years after the year of birth into my empirical model.[68] This lets me extend the "Static" model into a "Dynamic effect" model which is written as follows:

$$\log(w_{by}) = \alpha + \gamma_b + \gamma_y + \sum_{i=0}^{5} \beta_i \, UR_{b(y+i)} + X_{by}\delta + \varepsilon_{by} \qquad (2)$$

The coefficients of main interest are $\beta_i, i = 0, \ldots, 5$ since they can help us to understand the Dynamic effects of early life macroeconomic conditions on later-life earnings. These coefficients can also help us identify which year in the child's early development period is the most important in influencing later-life earnings.

[68]Since the "Static" model does not consider the effects of economic conditions of other years, the omitted variable problem will bias the estimation from the "Static" model. Thus, the "Dynamic effect" model also solves part of the omitted variables problem. Oreopoulos et al. (2012) also use the term "Dynamic effect" model that describes the economic conditions of the years after college graduation.

5. Main Results

5.1 Results from Static Wage Model

Before considering the main empirical results, Figure 1 shows that there exists a negative relationship between state unemployment rates at the time of birth and real wages in each state. Table 2 then shows that the impact of the state unemployment rate in the year of birth on the real wage is persistent and negative when we consider the full sample estimates. One can see the magnitude of the coefficient of main interest decreases about 7% when considering the place and year of birth fixed effects in the model. This could be because the model without fixed effects is capturing the role of general regional and time effects. For example, the tendency of region to display persistent weak economic conditions over time or the incidence of negative macroeconomic shock that occurred in a particular year. In terms of the magnitude, the estimates from the models with fixed effects and other controls indicate that the wage loss associated with bad economic conditions is about 1% for every one unit increase in state unemployment rate. In addition, one can also observe that bad economic conditions in the year of graduation have a negative effect on future earnings. In this case, a one unit increase in the unemployment rate at the year of graduation is associated with a 0.9 % earnings loss.

Table 3 shows the results from other samples, namely the sample with educational attainments above college and the sample with educational attainments below college.[69] The findings indicate that the impact of economic condition at time of birth on earnings is negative and again confirm that the financial input channel matters. Regarding the magnitude, from column (4), one can see that one unit increase of unemployment rate at birth is associated with 1.1% earning loss for the high-educated sample and 0.8% earnings loss for the less educated sample. In addition, one also can see that a one unit increase of the unemployment rate at the year of graduation is associated with 1% earning loss for the high-educated sample and 0.6% earnings loss for the other sample. If we compare the estimate of

[69] I also examine the extent to which educational attainment may be a mediating channel for the wage effect I observed. To do this, I set educational attainment as the dependent variable and related to the same measures of economic conditions in the year of birth that I use for my main specification. The result as shown in Table A1 indicate that the economic condition in the year of birth did not affect educational outcomes. This implies that educational attainment is not playing a significant role in driving the wage effect seen in my main specification. Thus, the impact of economic conditions in the year of birth on the later-life earnings could be via other mechanisms such as the childhood development of cognitive skills or non-cognitive skills (e.g. Carneiro et al. (2007)).

the impact of economic condition at year of graduation to the earnings of the college group with the estimates in the previous studies (e.g. Kahn (2010); Oreopoulos et al. (2012)), one can find that the estimate in this paper is lower than the estimates in the previous studies.[70]

[Figure 1 here]

[Table 2 here]

[Table 3 here]

5.2 Results from Dynamic Effect Model

Table 4 presents the results from the Dynamic effect regression model. The magnitude of the negative impact of the economic situation at year of birth on the earning is similar across different samples. A one unit increase in the unemployment rate is associated with 1.1-1.2% lower earnings. I find that economic conditions during the first five years after birth did not have significant effects on earnings. I also find that the magnitude of the effects of economic conditions at graduation varies across different samples. For example, a one unit increase in unemployment rates at the year of graduation is associated with 1% earning loss for the sample with educational attainments above college, which is again lower than the estimates in previous studies.[71]

[Table 4 here]

[70] The estimates of Table 4 in Khan (2010) and Table 1 in Oreopoulos et al. (2012) is between 1.6 % and 9 %. The lower estimates in this study could be driven by the measurement error since I do not have precise information to identify when the college graduates graduate.

[71] In addition, I also test for difference between the white and non-white samples. The results are shown in Table A2 and Table A3. From Table A2, one can see that the wage effect of economic conditions in the year of birth is significant in both of the white and non-white samples. The magnitude of coefficient is quite similar across the two groups. Table A3 tests the same hypothesis using an interaction term and confirms that there is no difference in the effects of economic condition of year of birth across the white and non-white samples.

5.3 Wage Group Analysis

The findings from the previous section have shown that economic conditions at birth had a persistent and negative impact on later-life incomes. As we mentioned in the introduction, the effect of financial input channel might vary across families and thus make the newborns have different level of initial human capital and different later-life earnings. To see if the effect could vary across wage groups, I use apply quantile regression to examine this issue.[72] From Table 5, one can see the negative impact of economic shock at year of birth is relatively larger in the low wage groups than in the high-wage groups. For example, from column (1), one can see that that a one unit increase in the size of the economic shock is associated with a 1.5% earnings loss in the lowest wage group (i.e. 0.1 wage quantile) but the impact is insignificant in the highest wage group (0.9 wage quantile). The negative impact seems to decay as the wage goes up. This implies that the initial economic shock matters, especially in the low-wage groups. I also plot these estimates in Figure 2, Figure 3 and Figure 4. These figures give us a clearly declining impact of economic condition at year of birth across wage groups.

[Table 5 here]

[Figure 2 here]

[Figure 3 here]

[Figure 4 here]

[72] I use "residual" wage and "residual" unemployment variables in the quantile analysis. The "residual variables" are the variables without the effects of year of birth, place of birth and other controls such as occupation and education. To get the residual variables, we can regress the variables of interests on other variables. We can then obtain the residuals which are thus defined as residual variables.

5.4 Some Concerns

There might exist a positive selection bias from fertility decisions during the economic downturns in my estimation. Parents in different income levels may be more or less likely to have children in a recession year. In fact, in the report of Taylor and Livingston (2011), which analyses US fertility data from 2008 to 2009, showed that both the Hispanic and Black fertility rates tended to declined substantially more than whites during an economic downturn.

In addition, on the policy side, the US government implemented the "Title X Family Planning Program". This was enacted in 1970 to help the low-income families with birth control. This program may have caused poorer families to have fewer children. Thus, given these two observations, we may infer that families at higher income levels are more likely to have children during periods of bad economic conditions. This could have positive impacts on newborn life choices in recessions and thus would impart a positive bias to our estimates. If this is the case, we can think of our estimate as a lower bound of the impact of the effect of being born in a recession on the individuals' earnings.

6. Conclusion

In this paper, I estimate the impact of economic conditions at the year of birth on the later-life earnings of individuals. An initial economic disadvantage may have either a positive or negative impact on the earnings of individuals through two different channels: the financial input channel and the time input channel. Two models are applied, a "Static" model and a "Dynamic effect" model. The main result from the "Static" model was that economic conditions at year of birth had a long-term negative impact on earnings. The earnings loss is around 1% per one unit increase in unemployment rate. The magnitude of the effect is similar among males with different levels of educational attainment.

The result from "Dynamic effect" model confirms that economic conditions at the year of birth play a significant role in influencing an individual's later-life earnings. In addition, the quantile analysis results further suggest that the initial economic shock affects more those in low wage groups than those in high wage groups. All the findings suggest that the financial

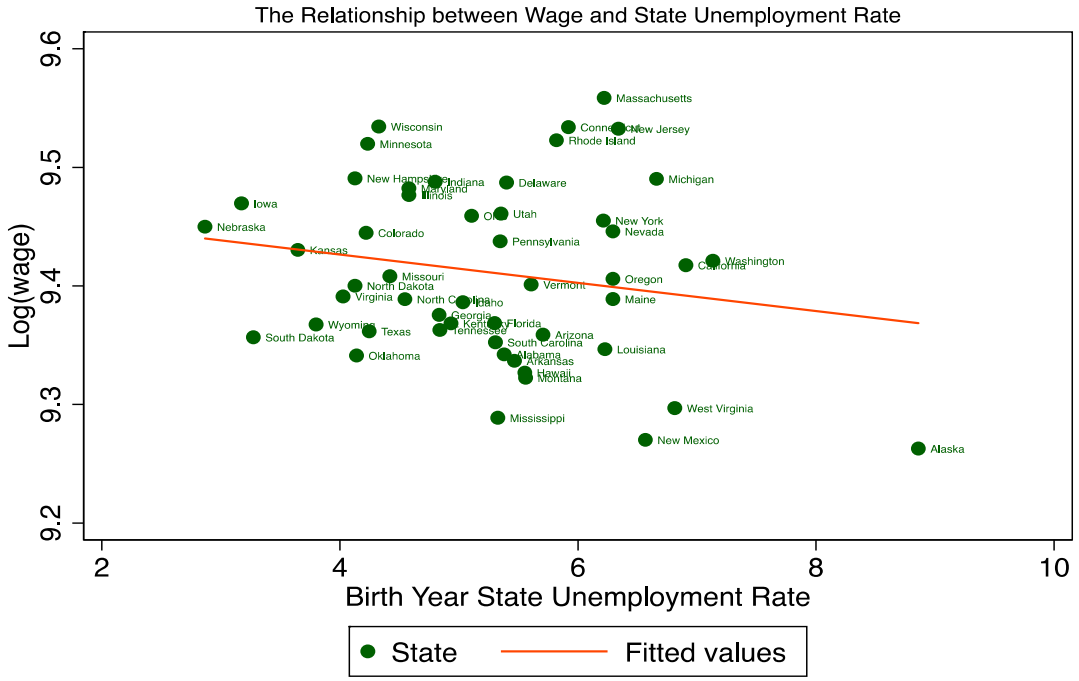
input channel plays a greater role than the time input channel in affecting an individual's labour market performance. The fact that the economic conditions at year of birth have a long-term significantly negative impact on individuals' later-life earning is an important and relevant finding for policymakers.

Table 1 Basic Descriptive Statistics

	Full Sample	Sample Above College	Sample Below College
Wage	16244.0 (4678.3)	18373.4 (6576.8)	14055.7 (2875.8)
University	0.215 (0.088)	0.433 (0.153)	-
White	0.832 (0.131)	0.866 (0.115)	0.801 (0.146)
Married	0.468 (0.179)	0.468 (0.211)	0.463 (0.155)
Management	0.203 (0.061)	0.349 (0.095)	0.0616 (0.021)
Manufacture	0.178 (0.059)	0.138 (0.048)	0.214 (0.074)
Observations	750	750	750

Note: The number in parentheses is a standard error. Samples are male cohorts between 1965 and 1979. The University variable refers to the people who study in the 4 years or 5+ years of college. Data Source: 2000 US Census.

Figure 1 Relationship between Wage and Unemployment



1. Male sample born between 1965 and 1979. 2. Data source: 2000 US Census.

Table 2 Static Model Estimation

Dependent variable	log(wage)			
Birth Year UR	-0.088*** (0.009)	-0.014** (0.006)	-0.010** (0.005)	-0.010** (0.004)
Graduation Year UR	-	-	-	-0.009** (0.004)
Place of Birth	No	Yes	Yes	Yes
Year of Birth	No	Yes	Yes	Yes
Controls	No	No	Yes	Yes
Observations	750	750	750	750

Note: All standard errors are clustered at the place of birth in parentheses. *** indicates 1 % significance level. ** indicates 5 % significance level. * indicates 10 % significance level. This table shows only estimates of interest and the estimates are from weighted regression models. Data Source: 2000 US Census.

Table 3 Static Model Results of Different Educational Groups

Panel A Sample Above College				
Dependent variable	log(wage)			
Birth Year UR	-0.112*** (0.011)	-0.011** (0.004)	-0.011** (0.004)	-0.011*** (0.004)
Graduation Year UR	-	-	-	-0.010** (0.005)
Place of Birth	No	Yes	Yes	Yes
Year of Birth	No	Yes	Yes	Yes
Controls	No	No	Yes	Yes
Observations	750	750	750	750
Panel B Sample Below College				
Dependent variable	log(wage)			
Birth Year UR	-0.063*** (0.006)	-0.012** (0.005)	-0.008** (0.004)	-0.008** (0.003)
Graduation Year UR	-	-	-	-0.006** (0.002)
Place of Birth	No	Yes	Yes	Yes
Year of Birth	No	Yes	Yes	Yes
Controls	No	No	Yes	Yes
Observations	750	750	750	750

Note: All standard errors are clustered at the place of birth in parentheses. *** indicates 1 % significance level. ** indicates 5 % significance level. * indicates 10 % significance level. This table shows only estimates of interest and the estimates are from weighted regression models. Data Source: 2000 US Census.

Table 4 Dynamic Effect Model Estimation

	Full Sample	Sample Above College	Sample Below College
Dependent variable		log(wage)	
Birth Year UR	-0.012***	-0.011***	-0.011***
	(0.004)	(0.004)	(0.004)
Birth Year UR(+1)	0.004	0.001	0.004*
	(0.002)	(0.004)	(0.002)
Birth Year UR(+2)	-0.000	-0.002	0.001
	(0.002)	(0.003)	(0003)
Birth Year UR(+3)	0.001	-0.001	0.001
	(0.002)	(0.003)	(0.002)
Birth Year UR(+4)	-0.001	-0.001	-0.000
	(0.002)	(0.002)	(0.002)
Birth Year UR(+5)	0.001	0.003	0.000
	(0.002)	(0.003)	(0.002)
Graduation Year UR	-0.008**	-0.010**	-0.005**
	(0.003)	(0.004)	(0.002)
Place of Birth	Yes	Yes	Yes
Year of Birth	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Observations	750	750	750

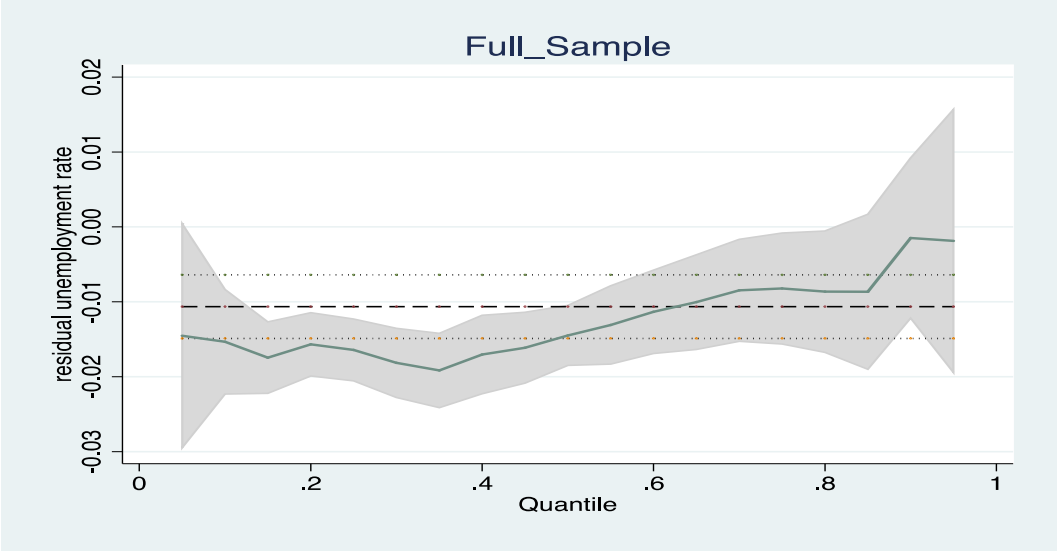
Note: All standard errors are clustered at the place of birth in parentheses. *** indicates 1 % significance level. ** indicates 5 % significance level. * indicates 10 % significance level. This table shows only estimates of interest and the estimates are from weighted regression models. Data Source: 2000 US Census.

Table 5 Quantile Regression Estimation

	Full Sample	Sample Above College	Sample Below College
Dependent variable		log(wage)	
0.1	-0.0153*** (0.0033)	-0.0208*** (0.0045)	-0.0178*** (0.0042)
0.2	-0.0157*** (0.0033)	-0.0176*** (0.0048)	-0.0157*** (0.0033)
0.3	-0.0182*** (0.0033)	-0.0177*** (0.0050)	-0.0151*** (0.0031)
0.4	-0.0170*** (0.0033)	-0.0189*** (0.0052)	-0.0147*** (0.0031)
0.5	-0.0145*** (0.0033)	-0.0164*** (0.0051)	-0.0126*** (0.0031)
0.6	-0.0113*** (0.0032)	-0.0158*** (0.0051)	-0.0122*** (0.0031)
0.7	-0.0085*** (0.0032)	-0.0133** (0.0052)	-0.0084*** (0.0031)
0.8	-0.0086*** (0.0032)	-0.0133*** (0.0051)	-0.0037 (0.0031)
0.9	-0.0015 (0.0033)	-0.0084* (0.0049)	-0.0043 (0.0030)
Observation	750	750	750

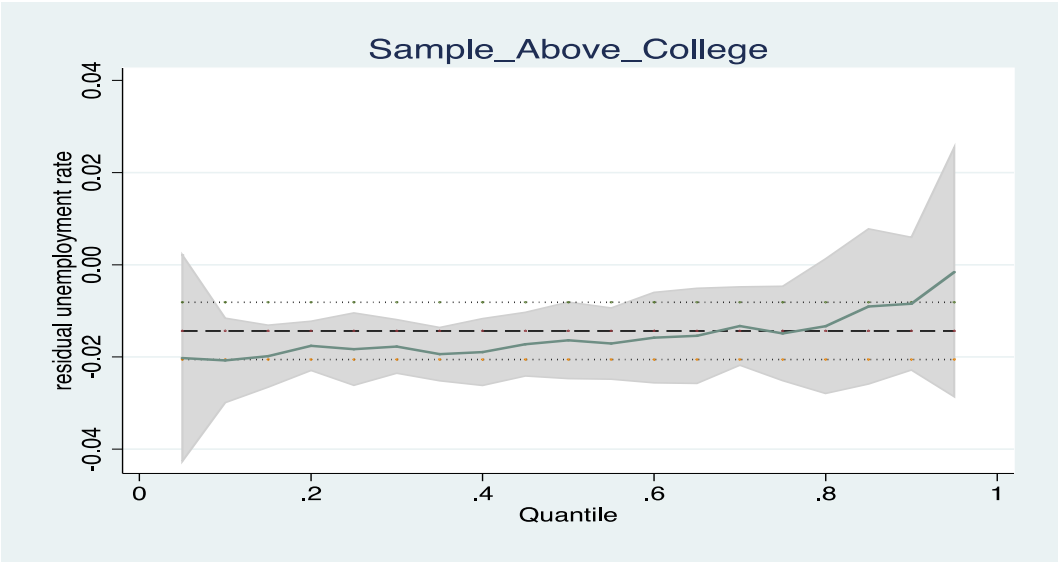
Note: *** indicates 1 % significance level. ** indicates 5 % significance level. * indicates 10 % significance level. Data Source: 2000 US Census.

Figure 2 Quantile Estimation of Full Sample



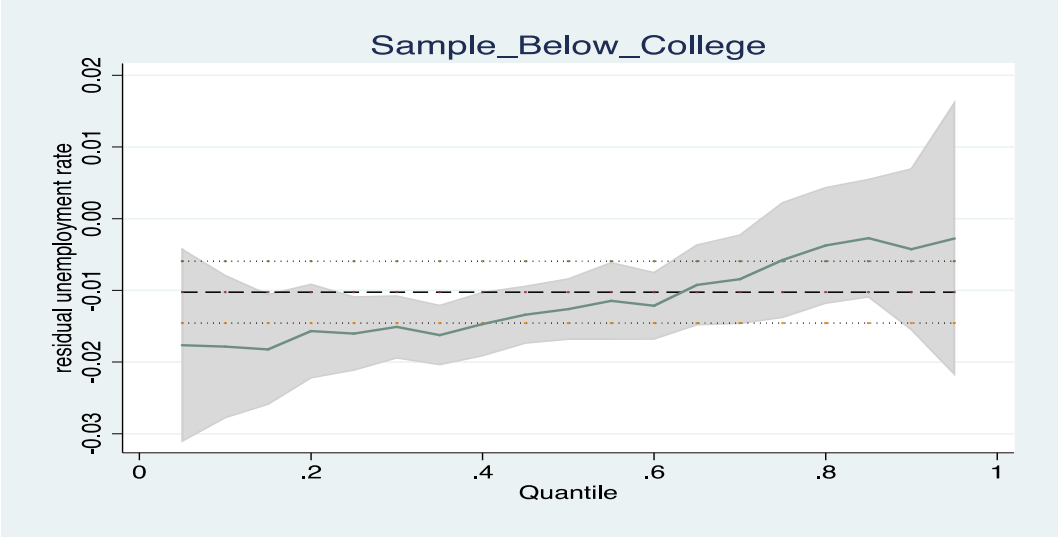
Note: Quantile regression plot by using collapsed residual unemployment rate and collapsed full sample residual real wage data from males born between 1965 and 1979. A confidence interval is associated each estimate in each quantile.

Figure 3 Quantile Estimation of Sample with Educational Attainments above College



Note: Quantile regression plot by using collapsed residual unemployment rate and collapsed sample residual real wage data from males born between 1965 and 1979. A confidence interval is associated each estimate in each quantile.

Figure 4 Quantile Estimation of Sample with Educational Attainments below College



Note: Quantile regression plot by using collapsed residual unemployment rate and collapsed sample residual real wage data from males born between 1965 and 1979. A confidence interval is associated each estimate in each quantile.

Appendix

Table A1 Education Estimation

	High Education (Above College)
Birth Year UR	0.002
	(0.002)
Birth Year UR(+1)	0.001
	(0.001)
Birth Year UR(+2)	0.002*
	(0.001)
Birth Year UR(+3)	-0.001
	(0.001)
Birth Year UR(+4)	0.001
	(0.001)
Birth Year UR(+5)	0.000
	(0.001)
Place of Birth	YES
Year of Birth	YES
Controls	YES
Observation	750

Note: All standard errors are clustered at the place of birth in parentheses. *** indicates 1 % significance level. ** indicates 5 % significance level. * indicates 10 % significance level. This table shows only estimates of interest and the estimates are from weighted regression models. The control variable in the estimation is racial variable, proportion of white population. Data Source: 2000 US Census.

Table A2 Results of Different Racial Groups

	White		Non-White	
	Static	Dynamic	Static	Dynamic
Dependent variable	log(wage)			
Birth Year UR	-0.010**	-0.013***	-0.011**	-0.010**
	(0.005)	(0.005)	(0.005)	(0.005)
Birth Year UR(+1)		0.004		0.001
		(0.003)		(0.004)
Birth Year UR(+2)		0.001		-0.004
		(0.002)		(0.005)
Birth Year UR(+3)		0.000		0.000
		(0.002)		(0.005)
Birth Year UR(+4)		0.000		-0.004
		(0.002)		(0.004)
Birth Year UR(+5)		0.004		-0.001
		(0.002)		(0.003)
Graduation Year UR	-0.016***	-0.013***	-0.005	-0.008**
	(0.005)	(0.004)	(0.004)	(0.004)
Place of Birth	YES	YES	YES	YES
Year of Birth	YES	YES	YES	YES
Controls	YES	YES	YES	YES
Observation	750	750	749	749

Note: All standard errors are clustered at the place of birth in parentheses. *** indicates 1 % significance level. ** indicates 5 % significance level. * indicates 10 % significance level. This table shows only estimates of interest and the estimates are from weighted regression models. Data Source: 2000 US Census.

Table A3 Difference Estimation Between White and Non-White Samples

	Static
Dependent variable	log(wage)
White X Birth Year UR	-0.004
	(0.004)
White X Graduation Year UR	-0.003
	(0.005)
Place of Birth	YES
Year of Birth	YES
Controls	YES
Observation	1499

Note: All standard errors are clustered at the place of birth in parentheses. *** indicates 1 % significance level. ** indicates 5 % significance level. * indicates 10 % significance level. This table shows only estimates of interest and the estimates are from weighted regression models. Data Source: 2000 US Census.

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